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BETTER FRUIT

The Pioneer Horticultural Journal of the Pacific Northwest

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Spray Calendar for 1922

What of the Use of Spreaders?

Miscible Oils and Fruit-Tree Leaf-Roller

Control of Anthracnose, or Black Spot Cancer

Treatment of Winter Injured Trees

Cherry Growing in Yakima Valley

The Red Rome, a Promising Apple

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ANNUAL SPRAYING NUMBER, FEBRUARY, 1922

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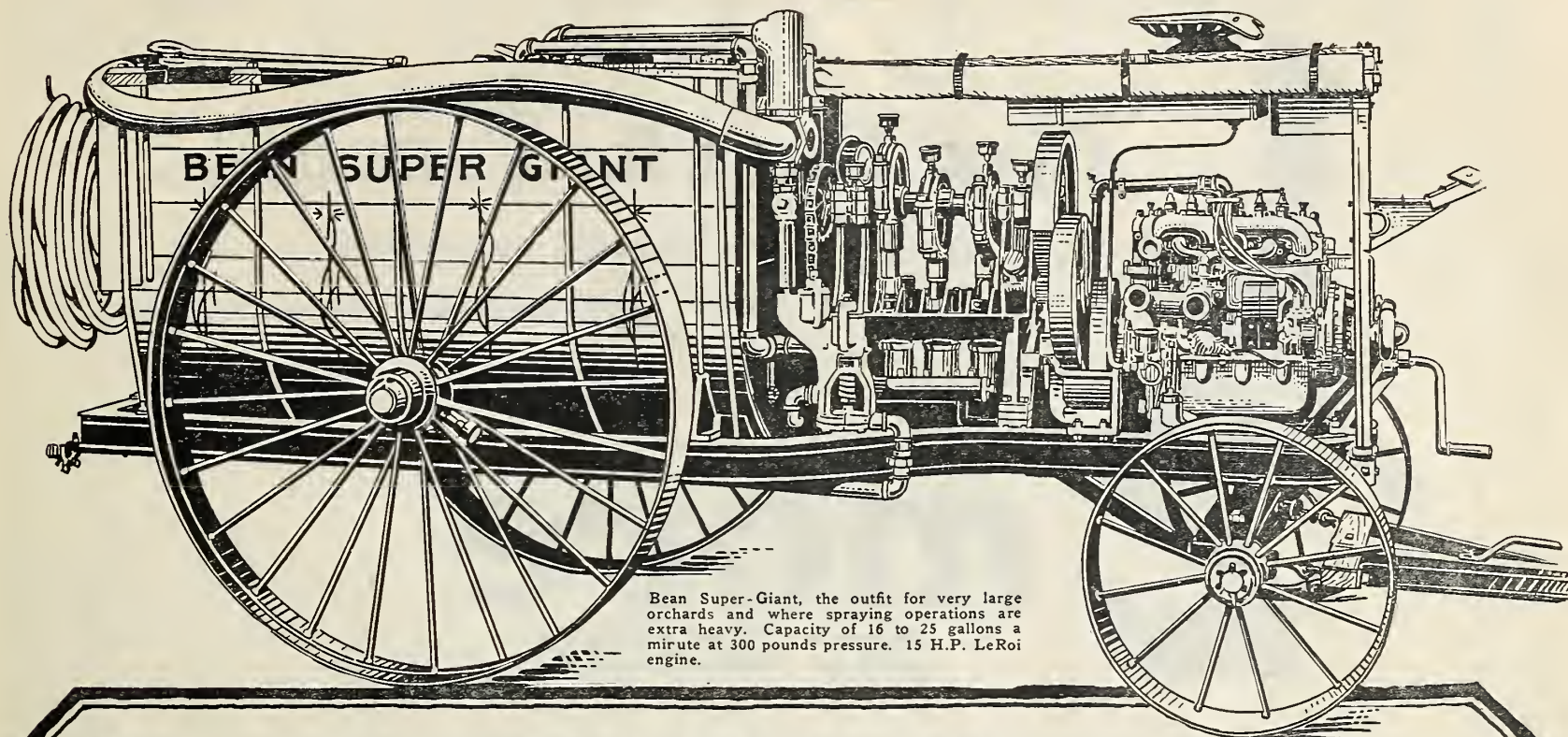
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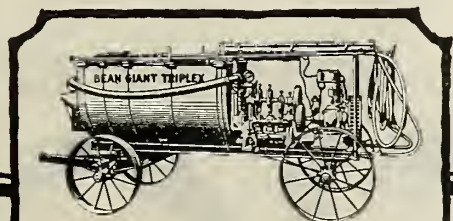
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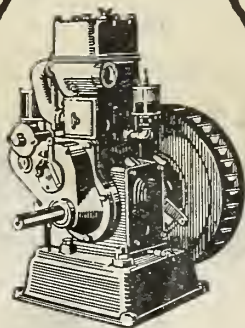
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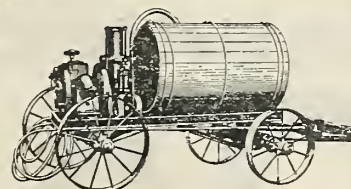
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What of the Use of Spreaders?

By A. L. LOVETT

Entomologist, Oregon Agricultural College Experiment Station

SOME of the more scientific phases of spraying have seemed, at best, a bit bewildering and there are few if any phases of the horticultural game in which changes have been more rapid or the kaleidoscope of improved practices has presented a more constantly varying aspect from year to year. As a grower has remarked and, no doubt, many others have thought, "just as we master the details of one new spray practice and begin to accept it as gospel, here comes another new wrinkle and the whole matter has to be threshed over again."

This avalanche of improved practices in spraying; improved combination sprays, improved technique in application, higher powered outfits, the spray guns, etc., is the most concrete and positive evidence of the importance of the subject and of the demand for more effectual and less expensive practices in spraying operations. To glance through a catalogue of sprayer equipment of twelve years ago or to peruse a spray bulletin of that period will impress one of the inadequacy of machinery and methods then pertaining.

How utterly futile it would be to attempt with such machinery the commercial orcharding of today with the pests it is now necessary to combat and the standard of excellence now demanded. Spraying is a costly operation; it is an exacting practice and all other things being equal, the grower who most nearly approaches the ideal in improved spray practices will achieve the highest degree of control at a minimum output of time and expense.

Necessarily, with new spray practices developing so rapidly, some must be still in the experimental stage; or where of proven merit for one section must needs require some modification to adjust them to maximum efficiency in another section.

The development of spreaders to be added to the poison spray solution for its physical improvement is one of the more recent improved practices. Yet, in spite of several years of fairly careful experimental evidence favorable to spreaders as a commercial orchard proposition, they are still

Orchard experts of the Pacific Northwest undoubtedly deserve credit for pioneering in the use of spray spreaders, and the writer of this article has been in the forefront in these investigations. It may be a long time, as Professor Lovett here indicates, before the last word on spreaders has been written. In the meantime painstaking investigations are each year leading the horticulturists nearer the basic fundamentals as to values and best types of spreaders. The facts relating to the Oregon tests and points wherein results differ in different sections are here set forth.

"on trial." Believing it a desirable thing to crystallize our present knowledge, practices, reactions and trend regarding spreaders, we have attempted in this article to summarize as far as possible this information.

HISTORICAL—The addition of materials to the poison spray solution to improve its physical properties is by no means new. Various materials including glue, molasses, soap, soap bark, gelatine, etc., have been used from time to time in more or less isolated cases for specific pests where the investigators appreciated the necessity for improving the "spread" of the poison solution.

Probably the first large scale investigation of spreaders for poison sprays, with a rather general application to the economic control of orchard pests, were those undertaken at the Oregon Experiment Station. The problem is still under investigation and surely the last word on spreaders has not yet been written. It is not worth while to review the investigation in detail. Among the really promising and practical substances tested as spreaders were: Calcium casenate, glue, gelatine, saponin, and oil emulsions. In considering their qualities as a spreader the following factors were necessarily taken

into account: Availability, (was the source of supply adequate); compatibility, (they must not react unfavorably with any ordinary spray material or combination of spray materials); efficacy, (in reasonable amounts they must actually give satisfactory results); ease of preparation (complicated formulæ, cooking, any operation requiring much close or additional work meets with little favor among our growers); the cost must be reasonable.

With these factors as the standards of excellence the casein spreader appeared the most promising. Oil emulsions are not such a poor second except that they are less fool-proof. If we could be sure our growers would handle an oil emulsion properly in all cases, it could become a close competitor, but the element of danger is too serious a risk for the general recommendation of oil.

CASEIN SPREADER—In the tests at the Experiment Station in the earlier field work ordinary commercial ground casein was employed. During the earlier commercial trials while growers "mixed their own," not all reports were favorable. The process in itself was subject to failure where any short cuts were attempted, then the casein available was variable in size of particles and in character.

Fisher of Washington, investigating the control of apple mildew, was also working with spreaders and recommended some modified formulæ and methods in preparation that were adopted in some cases. All told, the 1920 season may be summarized as one where the general idea of the use of spreaders gained ground rapidly, the use of spreaders but little.

With the opening of the season of 1921 some commercial companies had become interested and commercial casein spreaders appeared on the market. Of the powdered forms, which were by far in the majority, it may be said that in general they represented a high grade casein, ground somewhat finer than the ordinary commercial product and thoroughly mixed in definite proportions with hydrated lime. These

commercial materials combined all the essential factors desirable in the casein spreader and included to a most satisfactory degree the factor of ease in preparation, as it is possible to add the powdered spreader directly to the spray solution.

While interested primarily in the results and reactions resulting from the use of spreaders with poison spray solution, it might be well before taking up this phase of the discussion to mention some other uses to which this product has been put in orchard spraying operations.

Fisher, of Wenatchee, Washington, finds the casein spreader (modified formula) a desirable and effective addition to the lime sulphur spray for brown rot of prunes and cherries and for mildew control in apples.

Jones, of California, finds the casein spreader a most satisfactory and desirable substitute for glue in their lime-sulphur, oil and glue and B. T. S., oil and glue formulæ in their citrus spraying in Tulare county.

DeOng, of the California Experiment Station, favors strongly the addition of this spreader to lime-sulfur for red spider control.

It has been added and found to improve the sulfur sprays for red spiders, where the dry sulfur and casenate are mixed and then made into a paste and finally diluted with water. In whitewashes for trees it may be substitute for glue in their lime-sulfur, oil miscellaneous materials, giving an excellent covering and adherence to the whitewash.

SPREADERS IN ARSENATE SPRAYS—And now finally what is the status of spreaders in our general orchard spray program for codling moth control? There are a number of points to consider:

First—Does the addition of a casein spreader increase the efficiency of the poison spray in worm control?

Earlier investigations under rather carefully conducted controls at the Oregon Station indicated a fairly marked increase in the percentage of control obtained where spreaders were added to the poison spray solution. During the past two seasons results have been more variable, and certainly less conclusively in favor of the spreaders.

Reports from California are conflicting, some feeling that decidedly better results are obtained, others finding little evidence of improved control. DeOng, reporting on an arsenate foliage spray for red humped caterpillars, reports superior control where casein spreader was employed.

In the Wenatchee section of Washington there is a general impression that spreaders improve the efficiency of the spray. In the Yakima section less spreaders have been used and there is a general sentiment to the effect that spreaders do not improve the killing efficiency.

In the Twin Falls section of Idaho spreaders were quite generally employed and their use has received a most hearty indorsement from the growers. It would seem that they are enthusiastically united in the

opinion that spreaders materially increased the killing efficiency. Where spreaders have been used in Oregon there is a general feeling that the control has been improved. However, recent investigational plats do not bear this out in any striking detail.

SUMMARIZED, we may say that while there is much evidence to indicate that the addition of a spreader to the poison spray solution increases its killing efficiency, it is decidedly doubtful as to what extent this is true. It is our opinion that the value of a spreader in this regard will be, to a considerable extent, in proportion to the efficiency of the spray outfit; the excellence of the spray technique and the judgment in proper timing of the spray operation. Where any or all of these are faulty the value of the spreader increases. There is certainly no evidence to substantiate the report from the east that the addition of the casenate spreader decreases the efficiency of the spray.

Second—Does the spreader improve the spread of the spray?

All reports are agreed that, with the addition of a spreader, one obtains smoother, less conspicuous and a more even distribution of the spray. This accomplishes two outstanding results of merit. The even inconspicuous covering renders the fruit less likely to unfavorable suspicion regarding spray covering and makes wiping unnecessary in many instances. By avoiding the heavy blotchy covering of spray the red varieties color up more evenly, improving the appearance and grade of the mature fruit materially.

This factor of a smooth inconspicuous covering, thus avoiding the blotchy deposit and resultant uneven coloring is really important and to many growers serves as a good and sufficient reason for the enthusi-

astic adoption of spreaders in their late summer applications.

Third—Does the addition of a spreader increase the covering power of the spray solution so more trees may be covered per tank of spray?

Some growers have checked on this point fairly carefully and are convinced that there is a material increase in the number of trees one may cover with a tank of spray where spreader is added. Many have not checked on this and a note of warning on the point is worthy of thoughtful consideration. It would be a most unfortunate situation if the grower, imbued with this idea of quicker covering with less material, actually failed to use sufficient time or solution on the tree to obtain the thorough spray covering required.

So, while it is conceivable that by increased wetting due to the spreader we could get quicker covering, this should not become a factor of first importance when deciding for or against the spreader.

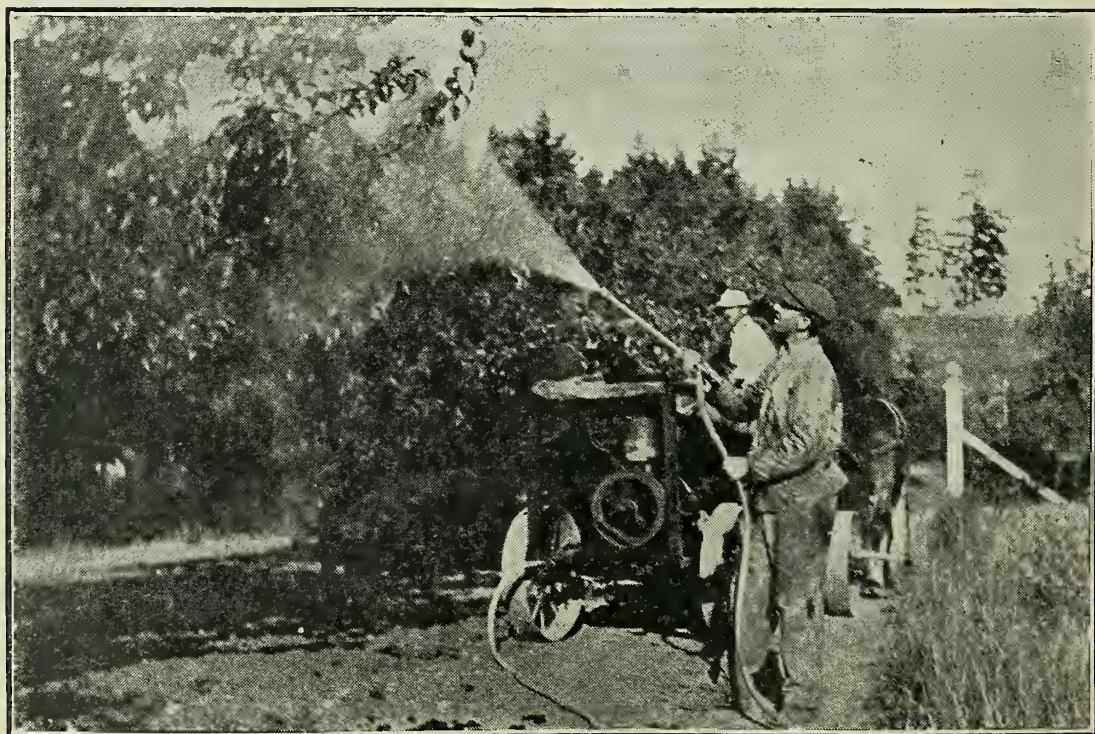
Fourth—Are spreaders advisable with all arsenical applications?

The consensus of opinion seems to be that spreaders should be used with all the lead arsenate applications from calyx or pink to the last cover spray. Considered strictly from a comparative point of view and valued on the beneficial results one might logically expect from its use, it would appear that the spreader in the solution could be dispensed with in the earlier applications if desired, but is of especial merit in the late cover spray.

Fifth—Should casein spreaders be used with other materials and at other seasons in spray applications?

No careful experiments have been made at the Oregon Station with spreaders except with the poison sprays.

(Continued on page 26)



Application of spray being made in orchard of Stewart Bros., near Victoria, B. C. with modern spray gun.

Control of Anthracnose, or Black Spot Canker

By E. W. WHITE

District Horticulturist, Department of Agriculture, Victoria, B. C.

It is a pleasure to present such an array of substantial, concrete data as are given by Professor White in this paper, on the control of one of the most troublesome apple-tree diseases our readers encounter. It is the substance of an address given last summer at a conference of horticulturists at Hood River, and delayed in submission to us. No little value is added through inclusion of detailed figures on spraying costs. As a whole, the article is so meaty the hand that might have cut it to considerably shorter length was stayed, and the report is given in full.

APPLE-TREE anthracnose, or black spot cancer, is prevalent in practically all apple orchards of the coast districts of Oregon, Washington and British Columbia, where control measures are not regularly adopted. It is perhaps the most serious fungus disease with which the coast fruit grower has to deal and, during the past twenty-five or thirty years, has caused the destruction of a great number of apple trees with corresponding financial loss.

It is not the intention in this paper to discuss the origin or life history of this disease or the proper scientific name by which it should be known, but rather to give briefly the results of five years' experimental work in the control of this trouble, carried out in the Keating district near Victoria, Vancouver Island, B. C.

In past years the general recommendation given to our growers for the control of this disease was to spray with double strength Bordeaux (8-8-40) as soon as the fruit was picked and before the fall rains commenced. Where this system of spraying was followed out very efficient results were obtained, especially on early varieties of apples. Even on late varieties, in a good many cases, the disease was held in check where the spraying was done thoroughly.

The trouble with this control measure, however, was not due to the inefficiency of the spray, but to the fact that the harvesting period is always a busy time for fruit growers and in the majority of cases early varieties were not sprayed when the fruit was harvested, and by the time the late apples were picked the wet weather had set in and it was often very difficult to get a fine day on which to do the spraying. In consequence infection took place and each year more dead wood could be found in the orchards.

Our growers were becoming discouraged

in their efforts to control the disease and were claiming that it could not be done economically and efficiently.

Consequently in the fall of 1916 the Horticultural Branch, in co-operation with J. W. Eastham, provincial plant pathologist, decided to do some experimental or perhaps better, some demonstration spraying.

In outlining the work we were very grateful for information relative to the success achieved in controlling the disease by Leroy Childs, director of the Hood River Experiment Station, by combining a Bordeaux spray with the last codling moth spray.

It was confidently felt that the disease could be controlled on early apples and for that reason a late variety was chosen with which to work. A block of 36 twenty-year-old Baldwin trees was selected in the orchard of Tanner Bros. Keating. These trees were very badly diseased and the owners had threatened to cut them out on numerous occasions. In fact, the disease was so bad that practically every bit of new wood which grew each year would be girdled by the canker the following spring. Nothing but the bare framework of the tree and innumerable dead shoots were left to constitute the tree. In 1916 the trees were carrying a very light crop of fruit, it being the off-year for bearing.

In planning to apply a weak Bordeaux early, while the fruit was still on the tree, it was thought that it would be necessary to wipe the fruit before marketing, but this was found to be unnecessary.

THE block of trees was laid out in four plots, the first nine trees in each row constituting Plots 1, 2, and 3, and the last three trees in each row constituting Plot 4, or check-plot. Plot 1 received only an early spray of weak Bordeaux, 3-4-40. Plot 2 received an early and late spray of weak Bordeaux, 3-4-40 and strong Bordeaux, 6-6-40. Plot 3 received only the late spray of strong Bordeaux, 6-6-40. Plot 4 was check-plot and received nothing.

In 1916 the first spray of 3-4-40 Bordeaux was applied on September 6, after a very dry summer, to Plots 1 and 2, constituting 18 trees; 80 gallons of spray mixture was used, averaging 4.44 gallons per tree.

The cost of materials and application for the first spraying was as follows:

6 lbs. Copper Sulphate at .10.....	\$.60
8 lbs. Lime at .02.....	.16
2 nozzle-men, 1 hour at .25 each.....	.50
Man and team, 1 hour at \$4.00 per day..	.50

Total Cost....\$1.76

Cost per tree, first application....9.77 cents

Following the application on September 6, the dry spell continued and practically

not a drop of rain fell up to the time the apples were harvested about October 21. In consequence of this there was a heavy coating of Bordeaux still adhering to the fruit when it was picked. The dry weather also caused a shortage of water and we were unable to carry out our original plan of putting on the second application as soon as the fruit was picked.

Rain began to fall on October 25 and continued intermittently until November 8. On this date the weather was favorable and the second spray of 6-6-40 Bordeaux was applied to Plots 2 and 3. Eighty gallons of mixture was made up and there was sufficient to spray 4 trees besides the 18 in Plots 2, and 3, so that the average number of gallons per tree were 3.63.

The cost of material and application for the second spraying was as follows:

12 lbs. Copper Sulphate at .10.....	\$1.20
12 lbs. Lime at .02.....	.24
2 nozzle-men, 1 hour at .25.....	.50
Man and team, 1 hour at \$4.00 per day..	.50

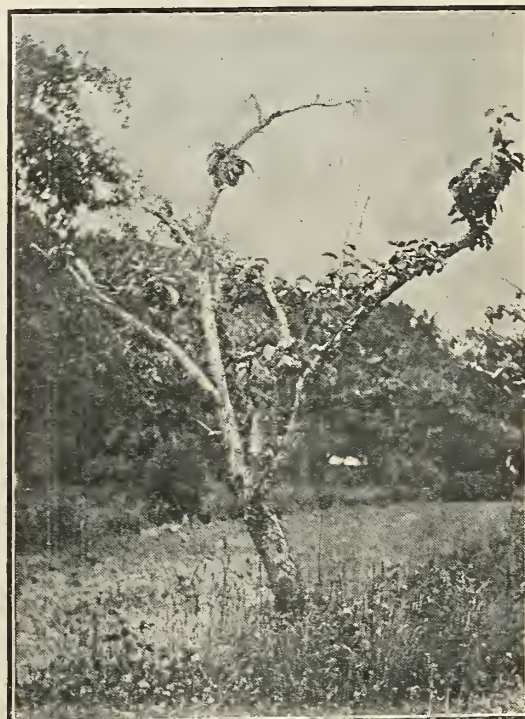
Total Cost....\$2.44

Cost per tree, second application..11.09 cents

In both sprayings and in the following sprayings a Bean Giant Triplex power sprayer was used and a pressure between 180-200 lbs. was maintained. The long-distance Friend nozzle was used in all sprayings.

STORING AND PACKING OF SPRAYED APPLES, 1916—After the apples were picked on October 21 they were placed in orchard boxes in ordinary shed storage and held until the first week in February, 1917. They were then packed and sold

(Continued on page 21)



Apple tree in British Columbia orchard, showing damage done by anthracnose, also cankers on trunk and branches

Orchard Spray Program for 1922

By H. P. BARSS and A. L. LOVETT

THE orchard man must fight for his crop against a considerable number of pests and diseases that are always on the job, and it is a fact, demonstrated every season, that the fruit grower cannot win in this fight unless he is likewise everlastingly on the job. His orchard enemies are fiendishly efficient, taking advantage of every opportunity offered to make their attack, and it is necessary to plan the spray campaign with the greatest care and execute it effectively so as to head off every thrust of the opponent.

The spraying program is a program of prevention. It aims to prevent the activities of these orchard pests and diseases almost entirely by covering the fruit, leaves or frame-work of the tree with a material poisonous to them, so they will have no avenue of entry. Failure is due in many instances, to lack of understanding of the proper weapon to employ and the proper time to employ it.

A spray calendar, such as the one appearing here, is intended as an aid to the grower in these particulars, but there are a few pointers that may be added as aids to complete effectiveness.

IRON SULFATE AS INDICATOR—With the dilute lime-sulfur sprays it is rather difficult to determine just how thoroughly the foliage is being covered or the fineness of the droplets reaching the tree. By adding iron sulfate at the rate of half a pound, dissolved in water, for each gallon of concentrated lime-sulfur used, the spray is turned black without the effectiveness being destroyed and the operator can tell at a glance just how well his work is being done. Many growers use this method in the scab sprays with satisfying results.

AMOUNT OF SPRAY REQUIRED—It takes a certain amount of spray to give satisfactory protection to a tree. LeRoy Childs, of the Hood River Branch Experiment Station, has determined by a survey of some of the best orchards in his section that it takes, on the average, about 4 gallons of spray to cover a healthy eleven-year-old tree and about seven gallons for a seventeen-year-old apple tree.

If the apple grower will figure up his spray tank average for last season he can determine whether he was using a safe amount per tree. One must always remember that it is just as important to cover the leaves, upper side and lower side, as it is to cover the fruit, for clean fruit is an impossibility in a tree filled with scab spots on the foliage.

THE TREE TOP—The average orchard will show more scab and worms in the tops of the trees than in the portions more easily reached by the sprayer. More thorough covering of the tops will repay

many times over the extra exertion and skill required.

SPRAY GUNS—The spray gun is a great time and labor saver, but must have sufficient power behind it if it is to equal the results secured by the old spray rod equipment. Furthermore no little skill is required to sweep the spray thoroughly through the tree from top to toe without missing some of the branches, drenching others, or actually causing injury to the surface of the fruit and to the foliage by the force of the powerful, direct drive of the coarse adjustment of the gun.

DRY LIME-SULFUR—Dry lime-sulfur is now being used by a good many fruit growers in place of the usual liquid lime-sulfur, on account of its greater conveni-



Time for the delayed dormant spray for scab, mildew and aphids. Should never be omitted in commercial orchards.

ence in handling and storing. When it is used in strengths sufficient to give the dilute solution practically the same equivalent strength as the usual dilutions of liquid lime-sulfur, the results seem to be equal to the latter.

Chemical analysis indicates that it takes about four pounds of dry lime-sulfur to equal the sulfur content of a gallon of commercial liquid lime-sulfur of 32 degrees Baume test. The Experiment Station still feels that the grower is taking some risk in using the dry material at dilutions very much under those called for by the usual spray schedule.

Notes on Spray Calendar

DORMANT SPRAY—The blister mite spray (pear) and the twig miner spray (prune and peach). It is effective for scale.

It is seldom advisable to omit this application on pears and, with the advent of blister mite in the apple orchard, it is equally important there. There is too

much blister mite injury in most of our fruit sections, warranting more serious consideration of the timeliness and thoroughness of this application.

Generally speaking, this spray cannot be safely omitted on prunes, because the twig miner is generally present and frequently wreaks serious havoc in unsprayed trees.

In the absence of these pests spraying for San Jose scale and red spider mites may be deferred until the delayed dormant stage, but in such cases the strength of lime-sulfur should be increased to the dormant strength of 12-100.

Oil sprays may be substituted for the standard lime-sulfur applications only for the control of scale and leaf-roller. For best results from the use of oil sprays it is essential that several days of settled weather follow the application.

The ideal time for the application of the dormant spray is about the middle of February if suitable weather for spraying occurs then. This application is not effective for the control of our principal fungous diseases, although peach leaf curl may be often checked considerably if it is not delayed too long. For this disease earlier winter spraying with Bordeaux is safer.

DELAYED DORMANT SPRAY, APPLE AND PEAR—The first scab spray, the aphid spray.

In Western Oregon satisfactory scab and mildew control cannot be expected where this application is omitted, poorly timed or indifferently done. Much mildew damage on the fruit starts at this early stage and scab gets under way promptly after the winter buds burst. Mildewed twigs should be pruned out during the winter. The old fallen pear and apple leaves should be turned under before this time since they are responsible for carrying the scab over from the previous season and, in most orchards, considerable benefit in scab control will result from this practice.

For apples, the addition of nicotine (Black Leaf 40) is advisable at this time for aphid control.

PINK SPRAY, APPLE AND PEAR—The second scab spray required to afford protection during bloom. Important for mildew control.

Where fruit worm injury to mature fruit was apparent last season lead arsenate should be added, excellent control being possible from this application.

PRE-BLOSSOM SPRAY, PRUNE, PLUM AND CHERRY—On stone fruits this spray is required only where blossom blight, due to the grown rot fungus, is troublesome, or where bud moths and aphids were prevalent the previous season and measures for their control are advisable.

FIRST FRUIT SPRAY, STONE FRUITS—For Syneta beetle, leaf-spot of prune and cherry, peach blight and mildew.

In orchards where the white Syneta beetle is present, and in such numbers as to result in serious injury, lead arsenate should be used for their control in this application, but because there is an element of danger in the use of regular commercial lead arsenate on stone fruits, it is advisable to add to each 100 gallons of spray 2 pounds of rock lime, carefully slaked and strained or an equal amount of hydrated lime.

Where peach blight and mildew are troublesome this spray should always be applied until under good control.

CALYX SPRAY, APPLE AND PEAR—For scab and, on apples, the first codling moth spray, and is very important.

The addition of lead arsenate is generally advisable even on pears as an aid in controlling late fruit worms, bud moth and similar foliage and fruit eating caterpillars. This spray is an aid in keeping mildew infections off new foliage.

Where orchard trees are not in vigorous condition due to lack of proper cultivation, soil fertility or good root conditions, growers often meet with spray injury from the lime-sulfur at ordinary dilutions applied at about this time, particularly where earlier lime-sulfur sprays have not been applied according to schedule. This is apparently worse some seasons than others due to climatic variations.

FIFTEEN DAY SPRAY, APPLE AND PEAR—Required in sections where scab is abundant. Cannot safely be omitted in the Willamette Valley.

Where slugs have skeletonized the pear foliage the previous year these pests may be checked by adding lead arsenate in this application.

THIRTY DAY SPRAY, APPLE AND PEAR—An important codling moth application, for which proper timing is essential. It is applied at the time the moths are depositing eggs for the first brood worms. The exact time for this spray will vary with the season. If possible, a specialist should be consulted, or the grower should inform himself in regard to the essentials in timing the application.

On scab susceptible varieties this spray can seldom be omitted in Western Oregon without danger. Where spray burn on fruit is feared, Atomic Sulfur or self-boiled lime-sulfur may be substituted for the ordinary lime-sulfur. On varieties little subject to scab this spray may often be omitted if the previous sprays have been carefully applied.

JULY AND AUGUST SPRAYS, APPLE AND PEAR—Applied for the second generation of the codling moth.

The exact time for best results from these applications is variable and best determined by specialists or from breeding cage records. Occasionally the late August application may be omitted on pears, but conditions vary so much with seasons and dis-

SPRAY PROGRAM FOR APPLES AND PEARS		
Application	Time Applied	Pest or Disease and Materials to Use
1. Dormant Spray	As winter buds are swelling and before they open.	For San Jose Scale, Blister Mite, and Red Spider Mites: Use lime-sulfur, 9-100 or, for scale, miscible oil, 8-100. For Leaf Roller (A): Use miscible oil, 8-100.
2. Delayed Dormant Spray	Cluster buds separating just enough to expose blossom buds.	For Scab and Mildew: Use lime-sulfur, 3½-100. For Aphids (A): Use nicotine, ¾ pound to 100.
3. Pink or pre-blossom spray	When the blossom buds are well separated in the cluster. Just before opening.	For Scab and Mildew: Use lime-sulfur, 2½-100. For Fruit Worms (P) and Bud Moth: Add lead arsenate, 2-100.
4. Calyx Spray	As last petals are falling. Before apple calyx closes on central fruit in cluster.	For Scab and Mildew (A): Use lime-sulfur, 2½-100. For Codling Moth (A): Add lead arsenate, 2-100. For Fruit Worms (P): Add lead arsenate, 2-100.
5. Fifteen-day Spray	About fifteen days after calyx application.	For Scab and Mildew (A): Use lime-sulfur, 2-100 (or self-boiled lime-sulfur, 8-8-50 if burning is feared.) For Pear-slug: Add lead arsenate, 1½-100.
6. Thirty-day Spray	Four or five weeks after the calyx application.	For Codling Moth: Use lead arsenate, 1½-100. For Scab* and Mildew (A): Include lime-sulfur, 2-100 (or self-boiled lime-sulfur, 8-8-50, where burning is feared.)
7. July Spray	July 10 to 25, depending on locality and season	For Codling Moth (second generation): Use lead arsenate, 2-100.
8. August Spray	August 10 to September 5, depending on the season and locality.	For Codling Moth: Use lead arsenate, 2-100.
9. Full Spray (Apple)	Late October or immediately after the fruit is picked.	For Anthracnose (A): Use Bordeaux, 6-6-50. (Where anthracnose is bad add Bordeaux 4-4-50 to July or August spray.)

(A) Where pest or treatment refers only to apple or only to pear this is so indicated, by the letter (A) for apple or (P) for pear, immediately following the pest or treatment.

*With d'Anjou, Howell, Comice and other tender-skinned varieties of pears and with apples susceptible to burn or russetting from regular lime-sulfur, substitute Atomic Sulfur, 12-100, or the self-boiled lime-sulfur.

SPRAY PROGRAM FOR PRUNES AND PLUMS		
Application	Time Applied	Pest or Disease and Materials to Use
1. Dormant Spray	Just as the winter buds are opening.	For San Jose Scale, Red Spider Mites and Twig Miner: Use lime-sulfur, 9-100.
2. Pre-blossom Spray	When the blossom buds are showing white, just before opening.	For Brown Rot Blossom Blight: Use Bordeaux, 4-4-50 with spreader, or lime-sulfur, 3½-100. For Bud Moth: Add lead arsenate, 2-100+lime 2 pounds. For Aphids: Add nicotine, 1-1200.
3. First Fruit Spray	As soon as the "shucks" or calyx parts are off the fruit.	For Leaf Spot: Use Bordeaux, 4-4-50, or self-boiled lime-sulfur, 8-8-50, with spreader. For Synta: Add lead arsenate, 2-100+lime 2 pounds.
4. June Spray	About June first.	For Leaf Spot (Beneficial for Brown Rot also): Use Bordeaux, 4-4-50, or self-boiled lime-sulfur, 8-8-50, with spreader.
5. July Spray	About July first.	For Leaf Spot (Beneficial for Brown Rot also): Use same materials as in preceding.
6. August Spray	About one month before picking time.	For Brown Rot: Use Bordeaux, 4-4-50, or self-boiled lime-sulfur, 8-8-50. Add spreader.

SPRAY PROGRAM FOR PEACHES		
Application	Time Applied	Pest or Disease and Materials to Use
1. Leaf Curl Spray	From December to mid-February.	For Peach Leaf Curl: Use Bordeaux 6-6-50.
2. Late Dormant Spray	Just as the first buds are ready to open.	For Peach Twig Miner, San Jose Scale, Red Spider Mite: Use lime-sulfur, 9-100. (If Scale is absent dilute 8-100.) For Aphids: Add nicotine, 1-1200. For Bud Moth: Add lead arsenate, 2-100+lime 2 pounds.
3. First Fruit Spray	Just after the "shucks" or calyx parts fall off.	For Peach Blight and Mildew on Fruit and Leaves Use self-boiled lime-sulfur, 8-8-50. If bad repeat in 2 or 3 weeks.
4. Early Fall Spray	As soon as the fruit is picked.	For Peach Blight, Twig and Bud Infections: Use Bordeaux, 4-4-50.

tricts that no uniform recommendations are possible. In case of doubt "keep the fruit covered with spray."

Where anthracnose has a bad hold in the apple orchard a Bordeaux spray should be
(Continued on page 27)

Treatment of Winter Injured Trees

By PROFESSOR W. S. BROWN

Chief in Horticulture, Oregon Agricultural College

In the December number was presented a comprehensive survey and discussion of tree injuries sustained by northwestern orchards and nut groves in the cold snap of two seasons ago, written by Professor D. F. Fisher. Here is the timely and logical follow-up treatment of such winter injuries, prepared by the chief in horticulture at Oregon Agricultural College. One of the highly valuable features of this paper, a contribution to the present fund of knowledge and practice, will be found in the advice given on types of wound coverings.

IT IS NOTHING unusual for young fruit trees to have their bark split open and rolled back during the winter season. This may be brought about by the warm, sunny days of February, followed by crisp, frosty nights. The results are often very serious to the trees because the trees frequently have much of the bark destroyed, thus shutting off the food supply running from the branches to the roots, and also allowing heart rot organisms to gain possession of the exposed wood.

Nothing within recent years, however, has equalled the extreme cold period during December, 1919, which killed so many of our fruit trees outright and which severely injured many others. The trees that are dead and those most severely injured will, undoubtedly, be pulled in course of time. Others less seriously injured may live for many years provided they are properly handled. On the other hand, they may die in a very short time if neglected.

The treatment we give these trees should accomplish at least two ends: First, it should prevent heart rot organisms from entering the wood of injured trees; second, it should bring about the healing over of the exposed wood by the bark, as soon as possible.

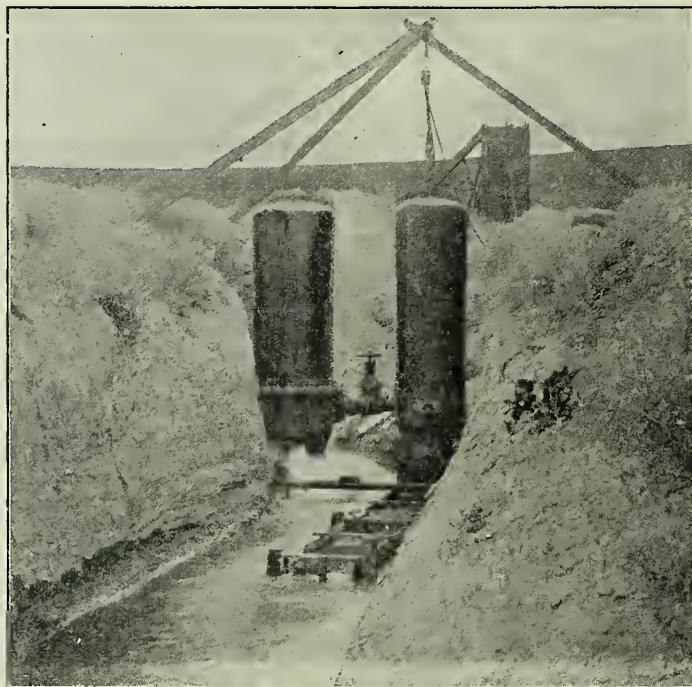
BRIDGE GRAFTING—On trees where much of the bark is still in good condition above and below the wounded surface, and where the wound is not too long, bridge grafting may be resorted to. When limbs have been affected severely at their bases, or when the tree trunks have been almost girdled the entire length, bridge grafting becomes very expensive and is seldom helpful enough to make the process worth while. The greatest danger in bridge grafting lies in the fact that heart rot may find entrance to the exposed portions of the wood and cause the tree to be short lived, even though the grafts may take.

DESCRIPTION OF BRIDGE GRAFTING—Bridge grafting is not a complicated matter,

though the work must be carefully done. Scions cut from any variety of apple will do. They must be cut during the dormant season and be kept in a cool, rather moist place until grafting is done. The scion stick should be from last year's wood growth, and should be about the size of a lead pencil or a little larger. When it is desired to keep these scions for some little time it is best to wrap them in moist sphagnum moss or slightly moist sawdust until time for grafting.

SETTING THE GRAFT—The bark on the tree must be cut back until good live bark is reached. The edges of this live bark are cut regularly and smoothly. A scion is then taken, sharpened at one end into a thin wedge-shaped stick, and inserted under the edge of the bark, usually on the lower side of the wound. Before inserting the scion, it will be necessary to make a vertical cut an inch or thereabouts in length into the edge of the good bark (Continued on page 19)

Irrigation With Hydraulic Ram



Double installation of 10-inch and 12-inch rams, installed in 1915 and still lifting water 140 feet on the ranch of Fred R. Hawn, Grandview, Wash.

THERE are many section and locations in the Pacific Northwest where the feasibility of using one of these remarkable water-lifting devices known as the hydraulic ram, as a means of putting water where it is needed for irrigation or other purpose, is too often overlooked.

The principle of the hydraulic ram has been known for more than 200 years and the device has been used extensively for such purposes as procuring water for household and domestic needs. Its adaptation to irrigation problems has been worked out only in recent years.

Engineers of the Pacific Northwest have done considerable pioneering in this field. Recognizing the many advantages of this economical means of delivering water in quantity sufficient for extensive irrigation, they have developed the ram of large size. They have succeeded in perfecting rams in sizes up to 24 inches and capable of

delivering as much as 3,600,000 gallons per day.

Wherever a running stream, flowing well or other water supply exists, from which a slight fall may be obtained to furnish the power head, a ram may be successfully installed. It is possible for one of these machines to make running water lift a considerable portion of its flow to any height, up to 30 times that of the fall in the supply pipe.

Economy of operation is a factor highly in favor of the hydraulic ram. It requires no fuel or expensive current to run it. No engineer is required to keep it going. Once started the action is continuous and automatic. It does the work of both a motor and a pump. It needs no oiling and is so simple in construction as to require practically no repairs or adjustments.

The orchardist who is contemplating installation of a new system of irrigation,

or changing or supplementing of his present system, owes it to himself to study the possibilities of the hydraulic ram. From the manufacturers he may obtain complete instructions on how to determine the feasibility of the mechanism or the size that may be required.

In the regions of extensive rainfall here in the Northwest, where streams abound, and even where there are only ditches and springs, there are innumerable locations where a ram might be easily installed. There are, adjacent to these supply sources,

any number of orchardists and gardeners who would like to do more or less irrigating. Or they may need power to pump water from some present supply. This little article should suggest the wisdom of investigating uses of this efficient combination power-pumping mechanism.

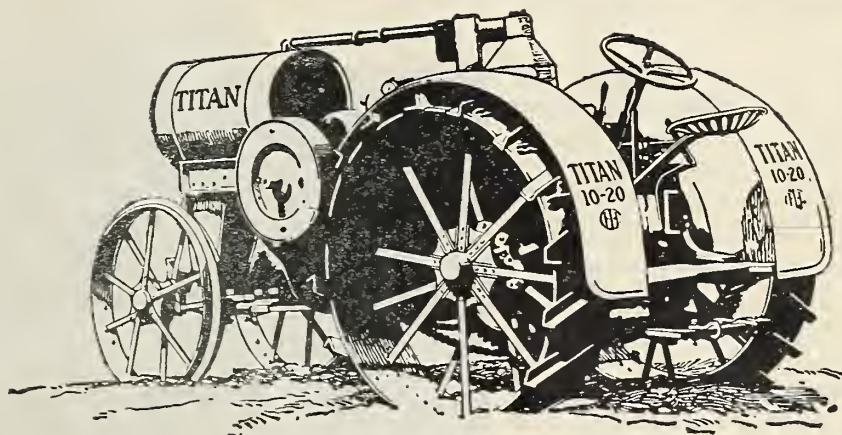
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They knew that these factors would guarantee their investments for years of usefulness. Year after year the wisdom of Titan-International Tractor ownership grows more apparent.

Let the judgment of these 100,000 farmers help you. For belt work now and for drawbar work in the spring, follow their advice. Use International equipment. *Remember that both Titan 10-20 and International 8-16 now sell for \$900—lowest prices ever quoted on these tractors with their present equipment.*

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New Grading Rules

GROWERS and shippers of the Northwest will be interested in learning of the changes in grading rules on apples which are to be put into effect in Washington as result of action taken at the state grade and pack conference, held at Spokane in December. At the time the conference adopted the new rules Charles L. Robinson, state supervisor of horticulture, announced that they will be accepted by his department.

The revised standards are as follows:

"Extra fancy, or first grade, apples are defined as mature, clean, smooth, hand-picked, well-formed apples only, free from all insect pests, diseases, bruises and holes, spray burns, limb rub, visible water core, skin punctures or skin broken at the stem, and shall be free from russetting except that russetting within the basin of the stem shall be permitted.

"Fancy, or second grade apples, are defined as apples complying with the standard of extra fancy grade except that leaf rubs, slight scratches and russetting be permitted up to 10 per cent of the surface of the apple; provided that slight limb rub not to exceed one-half inch in diameter or scab spots not larger than one-quarter inch in diameter in the aggregate shall be permitted; provided further, that two healed-over worm stings on apples carrying color requirements characteristic of the variety shall be permitted in this grade.

"C grade, or third grade apples, are defined as all those free from infection, soft bruises and broken skin; provided that this grade may include healed-over stings and scab spots not to exceed one-half inch in diameter in the aggregate.

"Extra fancy color requirements shall remain the same as the 1921 except that there shall be no color requirements on green and yellow varieties; that McIntosh Red and Krasnaya Spitz be changed from

solid red to striped red varieties, and the Winter Bananas from the green and yellow varieties to the red-checked or blushed variety; that color requirements for fancy grade remain the same as in 1921 except that there be no color requirements on red-checked or blushed varieties and on green and yellow varieties; that the C grade shall have no color requirements and that tolerance be increased from 5 per cent to 10 per cent.

"Scald, decay and other defects developing in fruit after packing shall be defined as applying to condition rather than grade; provided, that satisfactory evidence be presented to show that such defects were not evident at the time of packing."

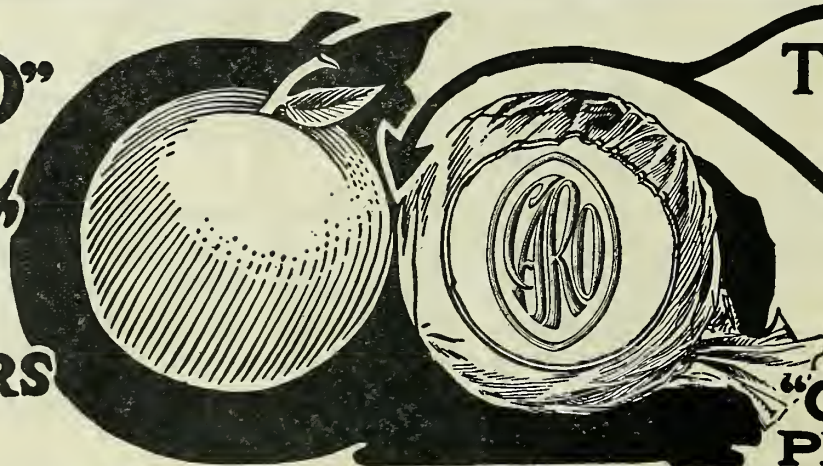
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Cherry Growing in Yakima Valley

By LUKE POWELL

Consulting Horticulturist, Yakima, Washington.

THE GROWING of cherries in the Yakima Valley is no longer an experiment, but one of the most profitable branches of the fruit industry. But in all lines of fruit growing one has to observe the essentials in order to be successful. And like the Ten Commandments, each must be kept, as neglecting of one will bring to naught all the time, labor and money spent on the others.

ESSENTIALS—(a) Proper rootstock (b) soil and moisture; (c) pruning; (d) varieties; (e) cross pollination; (f) protection.

ROOTSTOCK—We have two rootstocks on which cherries are budded and grown. The Mazzard for the sweet cherry and the Mahaleb for the sour cherry. The former is a very rapid grower and so is the sweet cherry; while the latter is a slow grower as, likewise, is the sour cherry. Thus, in each case they are naturally adapted to each other. If the sweet cherry is grown on the Mahaleb, or sour cherry root, and permitted to make a vigorous growth, this will continue for three or four years and then suddenly the tree will die, usually in June or July. The top or tree has simply grown too fast for the root. The latter, not being able to supply the amount of nourishment required by the tree, they

both die and three or four years' work is lost.

Sweet cherries are subject to the disease gumosis and, while not very prevalent in this valley, it is wise to take all precautions against it. It is a known fact that the Mazzard seedling is immune to this disease. Thus, in order to protect ourselves, we have found it a wise precaution to grow a Mazzard tree until it is large enough to form a frame work and then bud on it the sweet cherry varieties wanted. This work is usually done in July or August, following the spring the seedlings were planted. Usually the nurseries that sell the seedlings attend to this budding for the grower, budding the varieties wanted at the proper time.

SOIL AND MOISTURE—Cherries do well in most any good soil, but show a preference for the lighter soils. They need plenty of moisture up until some two or three weeks before the crop is picked. From then on until the fruit is harvested they need an abundance of moisture in order to produce a large, plump, juicy cherry. From then on, contrary to the belief of many, they should receive sufficient moisture to keep them growing nicely,

in order that they may set an abundance of fruit buds for next season's crop.

PRUNING—The young trees should be thinned out during the dormant season to the main scaffold limbs desired, then these should be headed slightly if the growth is more than 15 inches. This heading is done in order to get the stooling or whorl of limbs about 12 to 15 inches apart. Sometimes this can be done during the growing season by pinching off the tips when the branch has made from 12 to 15 inches of growth. However, summer pruning is a dangerous practice. The leaves are the lungs and also the digestive organs of the tree and their functioning should be interfered with very little during the growing season.

As soon as the tree gets into bearing it needs little or no pruning, except to keep out the cross limbs and give sufficient thinning to let the sunlight into the tree. Sunshine is a big factor in changing leaf buds into fruit buds.

SWEET VARIETIES—For shipping and a strictly commercial cherry, the Bing is in a class for itself. In the earlier districts the Black Tartarian being the first sweet cherry on the market brings a very good price. In the later districts the Black Republican, being the last cherry on the market, brings a fair price. But each should be considered more as a pollinizer than as a commercial product.

For canning, the Royal Anne is the



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YIELD, size, flavor, and shipping quality of fruits are dependent on the kind and amount of plant food available to the crop.

With the right kind of fertilization riper fruits can be harvested and shipped, and still reach the consumer in satisfactory condition.

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The fertilizer for fruit should be well balanced, and contain from 7 to 10 per cent. of Potash.

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queen of all cherries and is eagerly sought after by the canneries. The Governor Wood and Long Stem Waterhouse are canned to a limited degree, as are also the Black Tartarian and Black Republican. However, the real value of these four varieties is in pollination.

SOUR VARIETIES—The Montmorency Large and English Morello are each good canning cherries. The former is especially sought after by the canneries. The sour cherries are late bloomers and are scarcely ever injured by late spring frosts.

The May Duke is a very early semi-sweet cherry and is planted mostly for home use.

POLLINATION—The two leading varieties of sweet cherries, Bings and Royal Anne, are sterile and require pollen from some other variety in order to make them set their fruit.

For the Bing it is best to use both the Black Tartarian and Black Republican as pollenizers. The Black Tartarian begins to bloom from two or three days ahead of the Bing and is through by the time the Bing is half through. Just here the Black Republican starts in and finishes after the Bing. By this combination the Bing has pollen coming from one or other of these varieties all the time it is in bloom, thus insuring a crop.

For the Royal Anne the Governor Wood or Long Stem Waterhouse makes a splendid pollenizer. While the canneries take these two varieties at a considerable less price, the trees bear so prolifically that, as a rule, they pay very well.

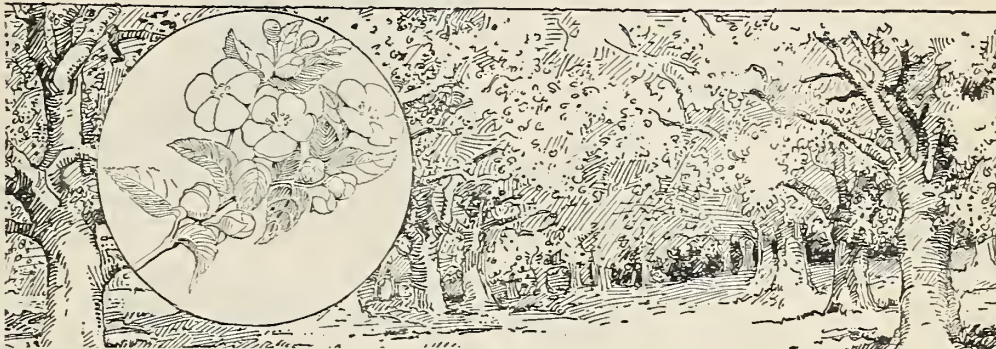
ARTIFICIAL POLLINATION—The essential thing in getting a pollenizer to be effective is to get it to bloom at the same time as the one needing the pollen, and then bringing them close enough together for the insects to distribute the pollen.

E. Bowles, the famous cherry grower of Prosser, Washington, whose crop in 1919 from seven acres was nearly fifty tons of cherries, made some of his Black Republican trees bloom a few days earlier in order that they would pollinize the Bings. This was done by putting up a large sheet of canvas on the north side of the trees which reflected the heat back into the tree. This brought the blossoms out from 2 to 3 days earlier and the crop he got proves his efforts were not in vain.

One large tree in the orchard had never borne any crop worth while, as it was too far remote from a pollenizer. Mr. Bowles determined to make it bear, and tried hanging out from one to two dozen fruit jars filled with water and bunches of blossoms from the pollenizer tree in this tree. The insects then did their part by liberally carrying pollen from these blossoms to the ones on the tree. The results were phenomenal. The tree produced really a heavier crop than it should. Thus, if we only lend nature a helping hand, she will repay us many fold.

The Bings, Royal Annes and Lamberts are not only sterile, but intersterile as to each other, however, they are pollenized by most any other sweet cherry and many seedlings that bloom at the same time they do. (Continued on page 18)

"Top Dressing Talks"



Ammonia Makes Fruit Buds

ARCADIAN SULPHATE OF AMMONIA applied about a week before blossom time (100 to 150 pounds per acre) will invigorate the fruit buds and increase the amount of fruit set. The failure of fruit to set and the early falling of fruit often is due entirely to nitrogen starvation. In some sections an early application of quickly-available nitrogen has increased the yields of fruit from four to ten times.

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VOLUME XVI. NO. 8

In the New Era

The old policy of selling only developed orchard tracts to new settlers has been a grave mistake. This was the statement made recently to Hood River men by C. R. Bone, pioneer developer of orchards. The thing that should be done and must be done to encourage newcomers, he said, is to sell them a tract of undeveloped land along with each planted orchard tract.

To our way of thinking, this suggestion is a highly practical, sensible and timely one. It is in accord with the keynote of our Home-seekers' number of last month. In that was stressed the fact that the new settler will do the best and be most satisfied only through purchase of reasonably priced good land and the transformation of this, by his own resources and labor, into an intensively developed acreage.

The suggestion of Mr. Bone puts the idea in concrete form. Beneath it is sound psychology. The plan provides for creative work on the part of the settler. In this are embodied the greatest joys and satis-

factions that come to the keen, normal man. If you do not grasp this fundamental truth read again the experience articles published last month. Every one of them pointed out the joy and the pleasure derived from development work in the fruit game.

It was shown, of course, that greatest financial reward also comes from development of a tract of land into a valuable and productive ranch. But do not overlook the fact that something more than monetary reward is necessary to make the red-blooded worker happy. "That something" is constructive, creative activity. The new arrival who promptly becomes engrossed in the job of developing a fruit farm isn't the least bit likely to be writing "back home" that he is dissatisfied in his new location.

In contrast would be the man who buys a developed tract, at top price, and is immediately confronted with the new and untried job of making it pay. If things go a little wrong it is this man who, in a few months, degenerates into one of those obnoxious pests known as the knocker. At present this pest is pretty well eliminated in the Pacific Northwest—why be so foolish as to grow another crop?

The best way to give honest value to the new settler and set him on the road to becoming a contented, prosperous booster is to see that he gets some land to develop.

The County Agent

It is a fine commentary on the value of the county agent's work that the wave of deep retrenchment sweeping most every county government of the Northwest leaves him untouched. If any county agent in northwestern states has been dropped from service as a retrenchment move the incident has not come to our attention. The nearest to anything of the kind was the case of an agent who resigned when confronted with a decrease in his budget allowance.

Had the country gone through a period of readjustment four or five years ago it is a safe conjecture that

many a county agent would have been dropped from his job as a bit superfluous.

But the agricultural agent has had time to demonstrate his worth. Each succeeding year has found him widening the sphere of his influence and service. He has come to be accepted, even by the tight-fisted type of farmer, as practically indispensable.

If you will read a monthly or yearly report of a faithful county agriculturist you will admit he has abundantly justified the salary paid him. The scope and variety of his activities are astonishing.

He cannot be an expert in all lines, yet rarely is an appeal for aid or advice sent him in vain. If his own fund of knowledge and experience falls short he knows where to obtain the needed information. He makes it a point to obtain it. In the course of a year he plugs a thousand little leaks and gives a thousand constructive suggestions. He has made good. He has won well-earned approbation. He has been scrutinized by the purse-pinching county commissioners and they have stamped him "O. K."

The Other Fellow

There are numerous things that should make for optimism among Western fruit growers. The big trouble with the pessimist is that he refuses to think of the fact that he has obtained a very satisfactory crop that has brought in remunerative returns, or the fact that railroad rates have been reduced again.

There is a simple rule for the man who prefers not to be a pessimist. He need only turn his thoughts to the plight of some of the other fellows. For example, would he care to change places with the sheepman who has seen the value of his flock dwindle until he faced bankruptcy, with almost no market for his wool? Or, just how would he be feeling now were he a corn grower in the Middle West, with his year's crop worth more as fuel than as a foodstuff?

Winning Letters

First prize award of \$10 for the best and most effective experience letter submitted for use in the January Homeseekers' Number, was given to Mrs. Flora A. Morgensen of Mosier, Oregon, for her article on, "Homesteaders in the Fruit Game." Second prize of \$5 was awarded W. S. Thornber of Clarkston, Washington, for his story detailing success with raspberries. Third prize of a three-year subscription went to T. D. Hussey, Clark's Fork, Idaho.

Notice!

Because of accompanying tables it was impossible to find space for the article on use of miscible oil sprays this month. It was thus crowded out after the index had been printed and will appear next month.

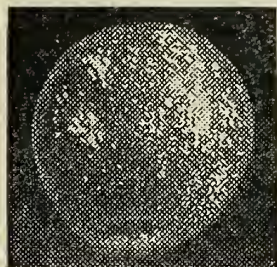


ALBATROSS BRANDS

Prevent

the "blotch" or "burn" of the
spray on fruit

Observe this study in contrasts. The apple at the left was sprayed with Arsenate of Lead—a wonderfully good spray. But the user neglected to mix "Spray Spread" with it. Below is a similar apple—sprayed with the same kind of spray—but Albatross Spray Spread was mixed with the spray. Note the difference—the "lead" dried on the FIRST apple in



Note the "blotch" or "burn" of the lead on this apple

spots or blotches. The second apple received an equal amount of protective spray—but it spread over the apple in a thin film. Appearance and marketing appeal of the apple is thus retained. The pictures tell why Government experts are so enthused over "Spray Spread"—why experienced horticulturists say it has NO equal for spreading an "arsenate of lead" spray.

ALBATROSS "SPRAY SPREAD"

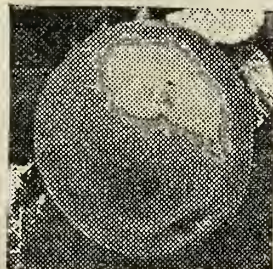
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Note the uniform, adhering film on this apple

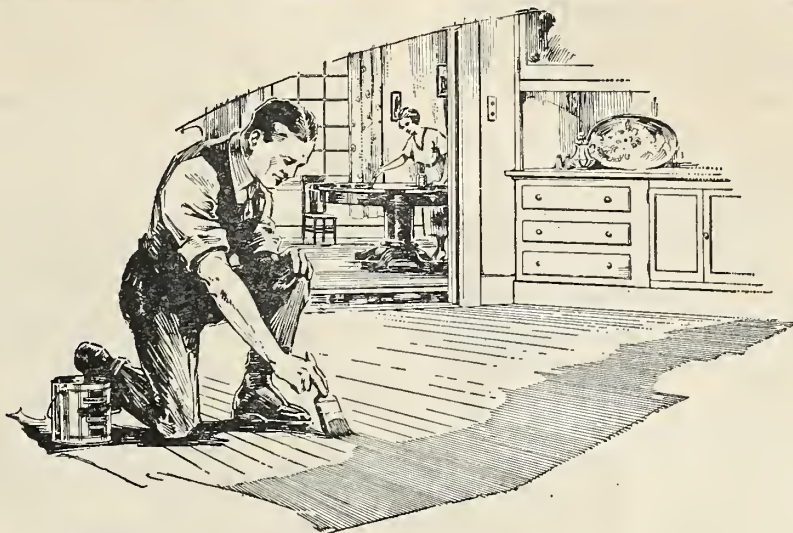
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Cherry Growing in Yakima Valley

(Continued from page 15)

THE spring weather during the blooming season has a great deal to do with the setting of the crop. Warm sunny days during the blooming season will facilitate the work. The pollen will be carried further and be much better distributed than if the weather is cold and rainy. The health and vigor of the tree is quite a factor, as the more food it has stored up, the easier it will be for it to set a crop.

Another factor worth considering is that while the birds are of much economic value to the fruit grower they do eat a few cherries. However, it is a known fact that the birds much prefer the smaller, softer cherries and seedlings to the large solid ones. So, if there should be no market for the pollenizer, they make a delicious bird food and not only serve the purpose of assisting the large sweet cherries to bear, but also lure the birds away from them.

DISTANCE FOR POLLENIZERS—In planting Bings I would set three rows of Bings then a row of Black Tartarians and Black Republicans in the same row, alternating them. Then six rows of Bings and then another row of the pollenizers and so on across the field. Bear in mind that the pollen is usually carried from three to four trees in all directions. Do not figure on the wind carrying the pollen as it only carries about 1 per cent, the insects carrying the other 99 per cent.

In planting Royal Anne use the same method. However, it is not necessary to alternate the pollenizers in the row. Use either the Governor Wood or Long Stem Waterhouse.

POLLENIZING OLD TREES—This can be done in two ways. (a) Plant young pollenizers as near to the old trees as possible, but not so close that the old trees will smother them. Give them plenty of care and make them grow as rapidly as you can. Prune very lightly by thinning out where they are thick, and thus they will bloom very early. Severe pruning retards the blooming and fruiting of trees. (b). Go up in the top of the old trees during the dormant season and head back sufficiently to make the trees throw up young vigorous growth the following growing season. Then bud into this new wood in August the pollenizers wanted. This will put your pollenizers in the top of your trees where the fruit is too high to pick, but they will function to make the tree bear and also protect your real cherries from the birds.

FROST PROTECTION—The rancher who is planning to set out a cherry orchard should study his location as to air drainage and be sure that his orchard is free from late spring frosts. Sweet cherries bloom very early and should either be above the frost line or protected by artificial means.

Ranchers who already have their trees

grown where they are subject to frosts should protect them. It can be done, for I have tried it and succeeded. Mr. Bowles, referred to in this article, used both oil and wood the year he got about 50 tons of cherries, smudging some four or five times.

The frost was so severe that trees outside of the line of fire had practically no cherries on them. However, the details of smudging, or heating the orchard, constitute an article of themselves and I may offer that at some future time.

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LOS ANGELES

Treatment of Injured Trees

(Continued from page 10)

of the tree trunk, then lifting up the bark from the wood at that point. Then the scion can be easily inserted for the length of the wedge.

THE scion stick is then measured to fit the distance of the wound to be covered, and sharpened at the upper end into a wedge. This wedge is then inserted under the bark in a similar manner to the insertion at the lower end. It is an excellent plan to have the scion a little longer than is necessary, so it will fit firmly in its place. Finishing brads or small staples should be used to tack the wedge portion of the scion to the wood of the tree.

Enough scions should be placed in this way to cover the wound, taking care not to insert them closer than two or three inches from each other for fear of loosening the bark around the tree.

When the grafts have been all set, waxing is the next operation. Liquid grafting wax is usually used, and this can be made according to the following formula: resin, 5 pounds, beeswax 1 pound, linseed oil 1 gill, finely powdered charcoal $\frac{1}{4}$ pound. The ingredients of this mixture should be melted up together and stirred until well mixed. Then it should be poured into vessels well greased. The wax may be laid aside when cold and melted up for use in the field when needed.

PRUNING—When much of the bark has been destroyed by the freeze it will be necessary, as a rule, to prune the top of the tree rather severely by cutting back and thinning out branches. This will enable the young grafts to carry up sufficient moisture for the top of the tree.

WOUND COVERINGS—In times past it has been a common practice to cover any wounded surface on the tree with some impervious material, such as lead paint, asphaltum, grafting wax, etc. It has been found by repeated experience that these coverings are open to one very serious objection. They all hold moisture underneath the covering, next to the wood. At the same time they are not sufficiently tight to prevent heart rot organisms from gaining entrance under the covering. Organisms of this sort thrive best in a moist environment, and therefore do better under these wound coverings than they would if the wounds were left exposed to the weather and allowed to keep comparatively dry.

In recent years many experiments have been tried with other materials with the idea of finding something that would be porous enough to allow moisture to evaporate through the covering. The most satisfactory material of this sort is a Bordeaux paste, made by combination of

copper sulfate with lime. This can be made up at home, as follows:

*“Bluestone Solution—Dissolve $1\frac{1}{2}$ pounds of bluestone (copper sulfate or blue

vitriol) in one gallon of water in a wooden, earthenware or glass vessel. This is best done by suspending the chemical in a bag of loosely woven cloth, or burlap, at the



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top of the water, or by pounding the lumps into small bits and dissolving by the use of hot water. This solution attacks metals (except copper) very actively.

"Lime Paste—Slake three pounds of quicklime with one gallon of water, in the ordinary manner.

"Mix in Equal Parts—When the lime is cool enough, equal parts of the bluestone solution and the lime paste should be mixed together thoroughly. Mix only enough at one time for a day's use. Apply like whitewash with a brush. The stock bluestone solution and stock supply of slacked lime can be kept indefinitely if not mixed together, provided water is added from time to time, to keep the solution up to the original volume.

"If Bordeaux paste is used alone its application should be repeated every fall."

POWDERED Bordeaux, which is now made by several manufacturing companies, can be used more conveniently. In this form all that is necessary before making application is to add sufficient water to the powder used to form a reasonably thick paste. This is then applied with a brush to the exposed surface.

Before making application of the Bordeaux paste, it will be necessary to remove all dead bark around the edges of the wound, cutting back to live, healthy tissue. All badly damaged branches should be sawed off where they join the trunk and their stumps covered with the paste. The great objection to the use of Bordeaux paste lies in the fact that it flakes off, during the rainy winter especially, and must be renewed every year. To prevent flaking and to make a paste which is more permanent in its nature, different ingredients are being tried with the Bordeaux to improve its sticking qualities. Calcium caseinate, at the rate of one-half teaspoonful to the gallon of Bordeaux paste, is one of these materials used to increase adhesiveness. This treatment is still in the experimental stage and must be watched carefully by anyone applying it.

Another combination that gives promise is a paint made by using raw linseed oil and powdered Bordeaux. The Bordeaux is slowly sifted into the oil and stirred so as to keep the powder from lumping. When the consistency of heavy paint is reached it is ready for use. This must be applied when the wood is perfectly dry if the treatment is to be successful. Only one coat should be applied in any one season.

It will be best for the grower to put on some of the linseed oil Bordeaux to a few trees, in comparison with a Bordeaux paste which he might use on the balance of his orchard. In a year or two, it will probably be possible to tell which is the better mixture to use. The main thing to look

after in applying the linseed-Bordeaux paint is to see whether heart rot develops under the paint.

By keeping these wounds covered in the manner described it ought to be possible to preserve many trees and save many an

orchard that would go to wreck in a short time if it were neglected.

YAKIMA fruit growers are buying more trees for planting than in some years past and many of them are for new plantings.

CUSHMAN

Greater Capacity and Pressure With a Lighter Engine

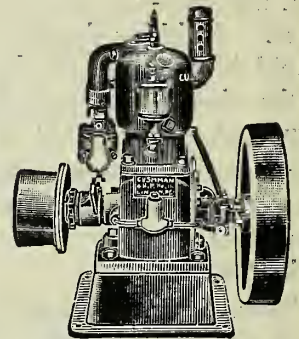
To meet the demand for lighter weight, greater capacity and the higher pressure that is absolutely necessary to produce the desirable "fog spray," several of the leading manufacturers of sprayers have standardized on light weight high grade Cushman Engines for their power.

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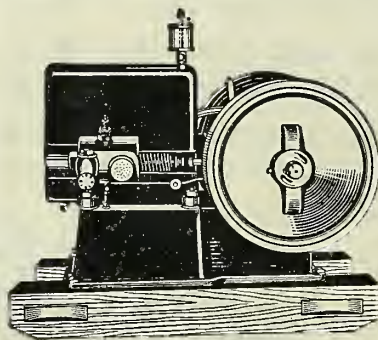
The 1½ H. P. Cushman handles the smaller sprayers of 3 to 4½ gallons at 200 to 300 lb. pressure.

The 4 H. P. Cushman (weight 190 lbs.) is the proper size for the larger triplex orchard sprayers with a capacity of 8 to 10 gallons at 250 to 300 lb. pressure or more.

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Established 1839
CLEVELAND

*See Page 136, Third Crop Pest and Horticultural Report, 1915-20, Oregon Agricultural College Experiment Station.

Control of Anthracnose

(Continued from page 7)

locally. The crop averaged one-half a box per tree.

It was found that when packing was commenced practically no sign of the Bordeaux mixture could be found, except very occasionally in the calyx or stem end of the apple, and it was unnecessary to wipe the fruit. However, the surface of the apples was left in a very sticky condition and it was almost impossible to wipe the fruit unless it was first washed. No complaint was received with reference to the apples after they were sold.

COUNTS OF INFECTION, 1917—On May 25, J. W. Eastham, plant pathologist, made the counts for infection on the plots with the following results:

Plot 1—early spray, 270 one and two-year-old branches examined from 5 trees, and 31 were found to be infected, or 11.4 per cent.

Plot 2—early and late spray, 375 one and two-year-old branches examined from 5 trees, and 27 were infected, or 7.2 per cent.

Plot 3—late spray only, 326 one and two-year-old branches examined from 5 trees, and 251 were infected, or 76.99 per cent.

Plot 4—check-plot, showed practically 100 per cent infection.

It will be seen by this that even the spraying the first year showed marked results. The late spray did some good, but

nothing in comparison with the early or the early and late spray.

(To be Continued)

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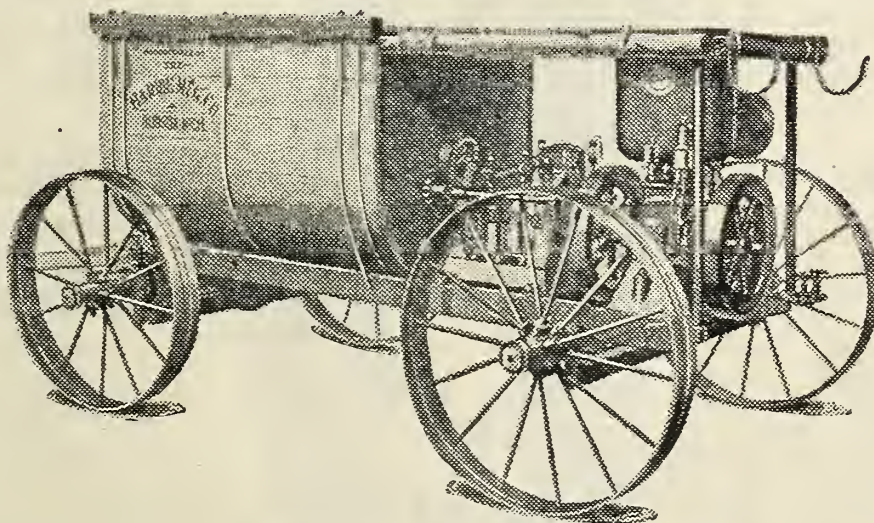
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December 15, 1922

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Northwest, so I wish to send a sub-
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manager of a fruit orchard.

Mrs. A. D. BIXBY

The Red Rome, A Promising Apple

By HENRY HARTMAN

Assistant Professor of Pomology, Oregon Agricultural College

IT HAS been evident for some time that Oregon and Western Oregon in particular, is in need of at least one new variety of apple, the fruit of which is red in color, of good size, and which keeps fairly late. The variety, in addition, must be a good producer and should be reasonably free from scab.

With this need in mind the Experiment Station at Corvallis, a few years ago, established an apple variety block of some 225 sorts, thinking that out of this number, surely a few would be adapted to Oregon conditions. Strange as it may seem, however, but few of these varieties seem promising at this time. Almost without exception the varieties have proved to be unsuitable for one reason or another. Out of the entire collection, in fact not more than two appear to be of such caliber as to deserve a place in the list of standard sorts. Of these, the Red Rome is undoubtedly the most promising.

The merits and weaknesses of the Red Rome can perhaps be best ascertained by considering, first, a few facts relative to its origin, and relative to its parent, the common Rome. The common Rome was first noted by H. N. Gillette of Lawrence County, Ohio, and was brought to the attention of the Ohio Convention of Fruit Growers in 1848. Like many other varieties the Rome originated as a chance seedling and its true parentage, therefore, is unknown.

The variety seems to have been popular from the beginning and even now it is a leading commercial sort in many apple sections. It is a favorite with many growers because of its early and regular bearing,

uniformity of size and comparative freedom from blemishes. It is respected by the trade because of its size, ease of handling, and slight susceptibility to scald and other storage troubles.

Shortly after the introduction of the Rome into cultivation, it became evident to horticulturists and especially to plant breeders that the color composition of this apple was more or less unstable. Occasionally, within the variety, there appeared individual fruits which displayed peculiar

TREES AND SHRUBS



Fruit trees budded from bearing orchards. Apple, Pear, Cherry, Peach, Plum, Prune, Apricot, Quince, Grape Vines, Shrubbery, Plants, Raspberries, Blackberries, Logans, Dewberries, Asparagus, Rhubarb, Flowering Shrubs, Roses, Vines, Hedge, Nut and Shade Trees. Carriage paid. Satisfaction guaranteed.

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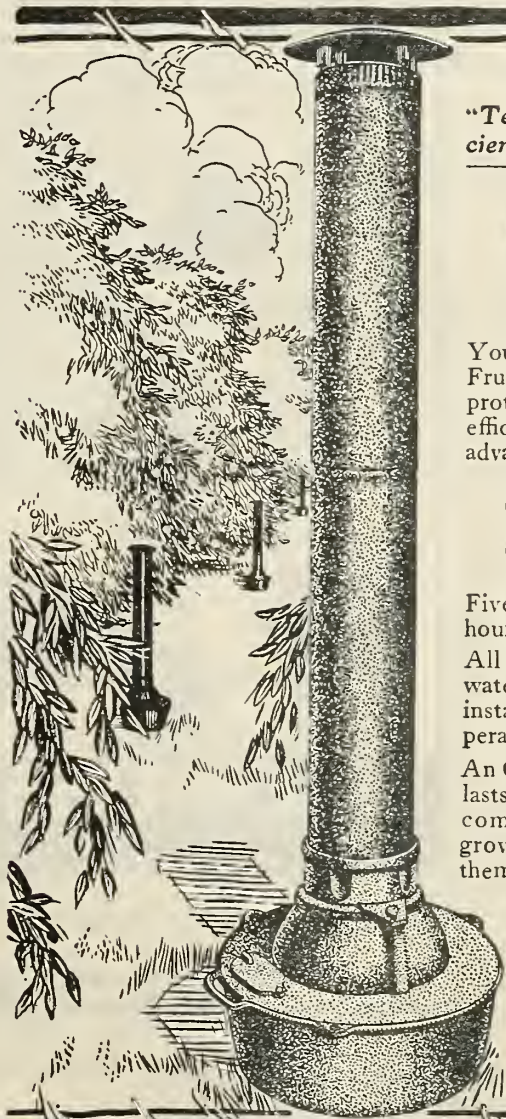
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Frost Insurance at Minimum Cost

You insure your house, why not your crop? Fruit growers everywhere can have assured crop protection through the use of this improved and efficient heater which has a number of notable advantages over any other kind.

Oldsmar Frost Protector Costs Less To Operate

Five gallons of distillate fuel oil burns 10 to 15 hours according to temperature desired.

All cast iron (stack excepted), the Oldsmar is waterproof and cannot get out of order. Lighted instantly, it requires little attention and temperature regulation is positive.

An Oldsmar costs less than other cast iron heaters, lasts longer, requires fewer to the acre; affords complete protection — California and Florida grove owners and truck farmers are ordering them by thousands.

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Coldwater, Michigan

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Distributors of Oldsmar Products

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Portland, Oregon



Golden Winesap

A Wonderful Apple

It has the juicy tartness of the Jonathan, the meatiness of the old Winesap, the beauty of the Winter Banana, the deep gold color of the Grimes and the keeping qualities of the good old Ben Davis. Strong grower, healthy and vigorous. Originated in Utah and should be hardy everywhere. Bears young and very profusely.

True Delicious Apple

This is the ideal farm apple. Large fruit, beautiful dark red, quality unsurpassed. Flavor sweet, slightly touched with acid, comes out of storage in perfect condition.

Campbell's Early Grape

A new variety, vigorous growth, very hardy, very early and an abundant bearer. Good shipper; keeps for weeks after ripening.

Perfection Currant

In our entire experience this is the best bearer, the largest, sweetest and easiest to pick. Rich, mild flavor, less acid and few seeds.

Low Prices Direct to You

All kinds of Fruit Trees, Plants and Shrubs, Vegetable, Flower and Field Seeds, etc., of the best quality, at very low prices. Get our Big Free Illustrated Catalog and prices before you buy.

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80 Court Street Beatrice, Nebraska

Seeds and Trees That Grow

color markings. A certain tree or part of a tree, for example, produced apples that were distinctly marked by longitudinal formulæ, cooking, any operation requiring evidence of two facts: (1) that the Rome carried at least two distinct factors for color, and (2) that segregation of these factors was being accomplished by bud variation. In the light of these facts, it was possible to predict that some day a red Rome would appear, i.e., a Rome wherein, solid red would be the dominant color. The prediction has come true, not once, but several times, for red Romes have appeared as bud sports in more than one instance.

So far as anyone can determine, the Red Rome is essentially a Rome embellished with a bright red covering. In other characteristics such as form, size, texture, quality and tree habits, it appears to be nothing more than a common Rome. This being true, a long test of the variety hardly seems necessary.

DURING the past few years, the Red Rome has been under observation in the experimental orchard at Corvallis and the members of the Department of Horticulture of Oregon Agricultural College feel that the variety is at least promising for Oregon and other northwest localities. Thus far, the variety has proved to be the equal of its parent so far as productivity is concerned. It withstood the freeze of December 1919, apparently without damage. It has shown no trace of spray injury either by Bordeaux mixture or lime and sulfur, and but little difficulty has been encountered in keeping it free from scab.

It must not be inferred, however, that the Red Rome is a perfect apple, free from all objectionable features. To quote an old proverb, "every rose has its thorns." There has been noted, in some individual cases, a tendency for the Red Rome to revert or change back to its parental type. Within the variety, occasionally a tree or part of a tree produces fruits which are striped or variegated, i.e., instead of displaying the solid red character, they display partial reversion to the color of the common Rome.

During the next few years some difficulty will be encountered in securing scion wood of the Red Rome that is absolutely free from reversion. The scion wood, in all cases, should be taken only from trees or parts of trees that are known to produce apples of a solid red color. Such scion wood should be selected or marked while the fruit is on the trees.

A considerable number of Red Rome trees are now fruiting in Yakima and other Washington districts. The Department of Horticulture at the Oregon Agricultural College will endeavor, during the coming year, to locate a number of trees that are true to type and from which scion wood may be obtained.

MYERS SPRAY PUMPS HAVE PRODUCED BIG ORCHARD PROFITS

From the half-hearted spraying efforts of earlier days to the specialized, efficient methods of today, through all the ups and downs of spraying to its present position, MYERS SPRAY PUMPS and ACCESSORIES have been Leaders, always playing an important part in the improvement and advancement of spraying by hand or power.

A few styles at first—small capacity bucket and barrel pumps—but they filled the needs of their time satisfactorily and paved the way for the now extensive line of fully proven and highly successful MYERS Hand and Power SPRAY PUMPS for Spraying, Coldwater Painting, Whitewashing and Disinfecting.

As a commercial fruit or vegetable grower, a farmer, nurseryman, or just plain home owner, with trees, vines, shrubbery and plants to spray MYERS SPRAY PUMPS—the "Honor-Bilt" Line, with the long record of success behind it and its present standard of construction with numerous patented features and improvements guaranteeing high efficiency—should be your first choice. And the MYERS Line is so extensive, that whether your spraying operations are large or small, there is a MYERS SPRAY PUMP that will fit your needs.

A copy of our 64 page Spray Pump Catalog, shows all styles with 20 pages of reliable spraying information, mailed free, without the least obligation, to anyone interested in spraying. A postal brings it to your door.

FIG. 1690, FIG. 1518, FIG. 1736, FIG. 1541, FIG. 1795, FIG. 1984, FIG. 1862, FIG. 1520, FIG. 1824

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MANUFACTURERS OF PUMPS FOR EVERY PURPOSE—
HAY UNLOADING TOOLS AND DOOR HANGERS

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Distributors

Mitchell
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Musical
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WE SAVE YOU MONEY!

W. Martius Music House, Inc.

1009 First Avenue, Seattle, Washington
Everything Known in Music

SHEET
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Advertising Apples

IT IS being felt more and more by those handling the Northwest's boxed apples, that an advertising campaign may be made of great value. This belief crystalized in the appointment of a committee on advertising, at the inter-state conference of horticulturists at Spokane a few weeks ago. This committee is headed by Professor C. I. Lewis of Salem. The other members are: Paul Weyrauch, Walla Walla; C. H. Swigert, Yakima; Dr. H. L. Geary, White Salmon; A. W. Stone, Hood River; David L. Oliver, Wenatchee; J. P. Gray, Nampa.

There is a feeling, Professor Lewis says, that a somewhat mistaken position has been taken with regard to advertising apples. Advertisements have stressed, first, the brand; second, the northwest apple; third, apples. The correct and more effective method would be to center most on advertising apples in a way to increase consumption. Secondly, the American public should be taught that the northwest boxed apple is the finest offered to the trade. In this scheme of things the organizations and private handlers would hold third place with their advertising of particular brands.

In this plan there would be effort to show the American people that apples are a food, not a luxury, and an economical food at that. There would be education also on the varieties the Northwest produces and the seasons for these varieties. Wider consumption of apples through education on new uses of them would be sought.

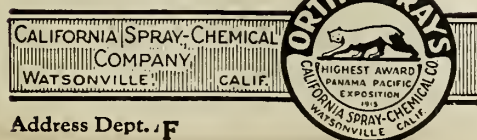
The phenomenal success of the Associated Raisin Growers of California in introducing the little red five-cent package of Sun Maid raisins is cited as an example of what may be accomplished. Introduced to the trade only on July 17, 1921, it was reported October 10, that sales of these had amounted to 331,000,000 packages. These equal 2,300,000 cases, or over 17,000 tons and had a value of \$16,500,000.

The advertising committee will hold a meeting during this month to take up the problems left to its hands, and its work may have far-reaching and very beneficial results.

Big Apple Crops

For bigger crops and better fruit spray your trees with ORTHO OIL EMULSION and Nitrate of Soda. ORTHO combines with nitrate without breaking down. Put your spraying problems up to us.

Write for Ortho Circular



Address Dept. F

MANY of our readers may be located where it is possible profitably to raise at least a few turkeys, ducks or geese. Give the matter a little thought and investigation. If you decide to attempt the venture with one or more of these fowls go at it with full determination to do it right. It is better not to start with them if you are to be content with haphazard methods.

ACCORDING to Frederick Benz, agricultural agent of the Northern Pacific railroad, formerly known as the "potato king" of the Northwest, his sons will realize about \$30,000 on potatoes produced on their ranch at Toppenish, Wash. The sons farm 320 acres, of which 80 acres is cropped to potatoes. The price received has been around \$27.50 per ton.

Figure Your Profit In Apples

Between big, perfect, sound apples—and knotted, dwarfed, unmarketable fruit the kind caused by aphid injury.

By the use of 8 cents to 12 cents worth of Black Leaf 40 Nicotine Sulphate per tree, you can control Aphid, Thrips, Leaf Hopper and other soft-bodied sucking insects.

Just picture the difference in your own orchard between a yield of sound fruit and a crop of knotted and dwarfed "aphid apples."

Why, a mere handful of these culls will cost you more than the quantity of Black Leaf 40 required per tree.

BLACK LEAF 40

Nicotine Sulphate

Black Leaf 40 has for many years been the "true and tried" protector of the crops of the progressive growers of the United States and Canada against these insect pests that are so destructive to your orchard profits.

Send for copies of complete spray chart leaflet and bulletins, with name of nearest Black Leaf 40 dealer.

Tobacco By-Products & Chemical Corporation

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LOUISVILLE, KENTUCKY

For your Dormant Spray

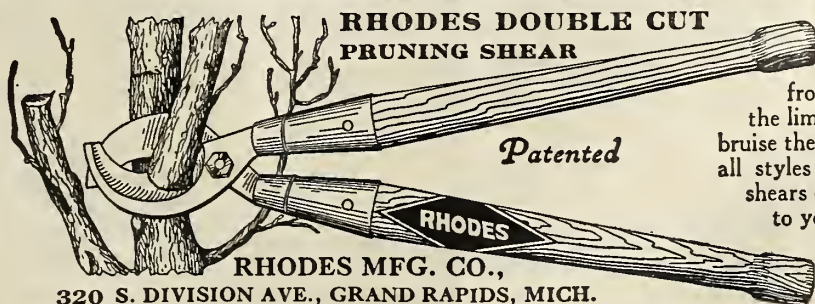
DORMOIL

Especially for Leaf Roller, Scale, Aphid, Blister Mite, Red Spider, etc.

DORMOIL has been used with remarkable success in Oregon, Washington and Montana. Write for details

HOOD RIVER SPRAY CO.

Hood River, Oregon



THE only pruner made that cuts from both sides of the limb and does not bruise the bark. Made in all styles and sizes. All shears delivered free to your door.

Write for circular and prices.

What of Spreaders?

(Continued from page 6)

Smith, of Idaho, considers the addition of the spreader decidedly improves the efficiency of dormant lime sulfur in scale control; and lime sulfur in the delayed dormant for red spider control.

DeOng, of California, considers spreader addition advantageous in red spider and aphid control sprays.

Wenatchee authorities find improvement in most of their spray applications from the addition of casein spreaders. It was observed that in the lime sulfur, arsenate combination sprays, casein spreader reduced and retarded the development of sludge.

Where improved wetting, covering and adherence of sprays is desired the addition of casein spreader improves.

Sixth—What are the adverse reports on casein spreaders?

With a new substance introduced extensively for the first time and tested under a great variety of circumstances some adverse reports and serious criticisms are to be expected. Vague rumors and occasional reports coming in during the season led me to expect rather definite and general unfavorable reports upon some points. May I say that, everything considered, I am most agreeably surprised at the general and united favorable attitude on spreaders.

The human element must needs enter into any tests of this nature to a certain extent. Certain individuals have a bump of perverseness which prevents them following explicitly the instructions printed on the container.

Finally, the one rather universal serious criticism or complaint of the commercial casein spreaders is their cost. The cost is too high is the tenor of the report. In this article, I attempt neither to condone nor defend; I do hope it will be possible, as the business develops, for the commercial companies to decrease the cost of their product.

D. F. FISHER, federal pathologist of Wenatchee, has developed two modified casein formulæ and they were used rather extensively in the Wenatchee fruit section by growers last season. Two different methods have been used. One is this: Water, 1 gallon; caustic soda, 3 ounces; casein, 1 pound.

The caustic soda is dissolved in the water while bringing to a boil, then the casein is slowly sifted in with careful stirring to avoid lumping. A little boiling will dissolve the casein and this solution then forms the stock solution and may be used as a spreader at the rate of one pint to the 100 gallons, or the above amount is sufficient for 800 gallons of spray.

The second method is similar except that one employs baking soda instead of caustic soda, and the material does not need to be cooked. Probably a rather finely ground casein would be advantageous, and two

gallons of water would avoid working with so thick a paste as otherwise. This stock must be used within reasonable time after its preparation because of the deterioration with a development of most unpleasant odors.

Summarizing our information on the casein spreaders, then, we may say that:

First—While there is considerable room for question as to the value of spreaders in increasing the toxic efficiency of the poison spray application where high powered outfits are employed in the hands of experienced operators and applications carefully timed; for the vast majority of growers the addition of spreaders is of advantage.

Second—By increasing the evenness of the spray deposit it is possible to obtain a more even coloring of the fruit, a point of more than passing importance. If it will avoid the necessity for wiping, as was the case with many growers last season, this likewise will prove a decided factor in favor of their more general adoption.

Third—The addition of spreaders to other applications than the poison sprays seems equally desirable and effective in increasing their values under the same conditions.

Fourth—The cost of the commercial caseinate spreaders tends to operate against their more universal acceptance by growers. This point is one the commercial concerns must appreciate and any possible reduction in price commensurate with good

business should receive the most serious consideration.

It is our opinion that spreaders have come to stay. Undoubtedly improvements and modifications will take place as our knowledge and experience of spreaders increase.



Have Fenner build your home

KNOW in advance exactly how your home is going to look—what quality of materials will be used—when it will be completed—what it will cost.

For eleven years Fenner has designed and built Fenner Factory Cut Homes in all parts of the country. Cutting at the factory eliminates waste in materials and lessens labor costs. When you build a Fenner home you get better materials, better construction and save money. More than 100 designs to choose from.

Send 25c for the beautiful Fenner Plan Book showing colored illustrations and floor plans.

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FENNER MFG. CO.
Foot of McKenna Avenue, Portland, Oregon



AT LEAST 10,000 BOXES DUE TO NITRATE OF SODA

In a letter written January 11th last, Mr. Arthur L. Helliwell, general manager of the well-known Wenatchee-Beebe Orchard Company, states that their orchard experts are unanimous in giving credit to nitrate of soda for "at least 10,000 boxes" of a 15,000 excess apple crop last fall.

Mr. Helliwell's company used 20 tons of our Nitrate of Soda in the Fall of 1920 and another 20 tons in the Spring of 1921. This aggregate of 40 tons was scattered over those portions of their 400-acre orchard, which seemed most in need. From 150 to 300 pounds per acre was used.

"I have taken the time," says Mr. Helliwell, "to make a very careful study of the needs of Wenatchee orchard soils, and I am well convinced that it is nitrogen and humus rather than potash or phosphorus that our soils need."

Write Us TODAY For Prices and Particulars. Rejuvenate Your Orchard
With Nitrate of Soda

THE NITRATE AGENCIES CO.

HOGUE BUILDING, SEATTLE

Spray Program for 1922

(Continued from page 9)

applied to the trees before the coming of the fall rainy period. The best time for this would be with one of the summer codling moth sprays.

SPRAY PROGRAM FOR CHERRIES—An elaborate spray program for cherries is usually unnecessary. Of the insect pests for which sprays are generally applied we have the San Jose scale and aphids. For the control of these a combination spray of lime-sulfur 12-100, plus Black Leaf 40, 1 pound to 100 gallons, should be applied just as the buds are swelling and before they open.

Because ants carry aphids up the trunks to reinfest the trees, it is advisable after spraying to band the trunks of the cherry trees with a strip of tree tanglefoot, two and a half inches wide.

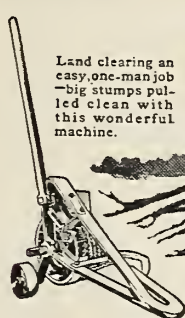
Where blossom blight caused by the brown rot fungus is troublesome a spray of Bordeaux 4-4-50 should be thoroughly applied just as the first blossoms are starting to open, but in many orchards this trouble

is not serious enough to require attention.

Where cherry leaf spot is bad several sprayings with Bordeaux 4-4-50 will ef-

fectively reduce the injury if applied beginning about the last of April or the first of May and repeated at three-week intervals.

Land clearing an easy, one-man job—big stumps pulled clean with this wonderful machine.



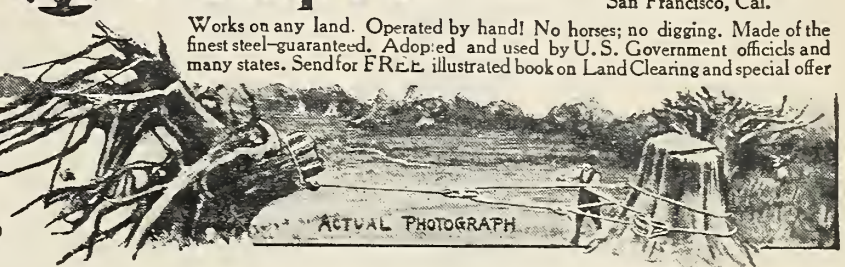
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Works on any land. Operated by hand! No horses; no digging. Made of the finest steel—guaranteed. Adopted and used by U.S. Government officials and many states. Send for FREE illustrated book on Land Clearing and special offer

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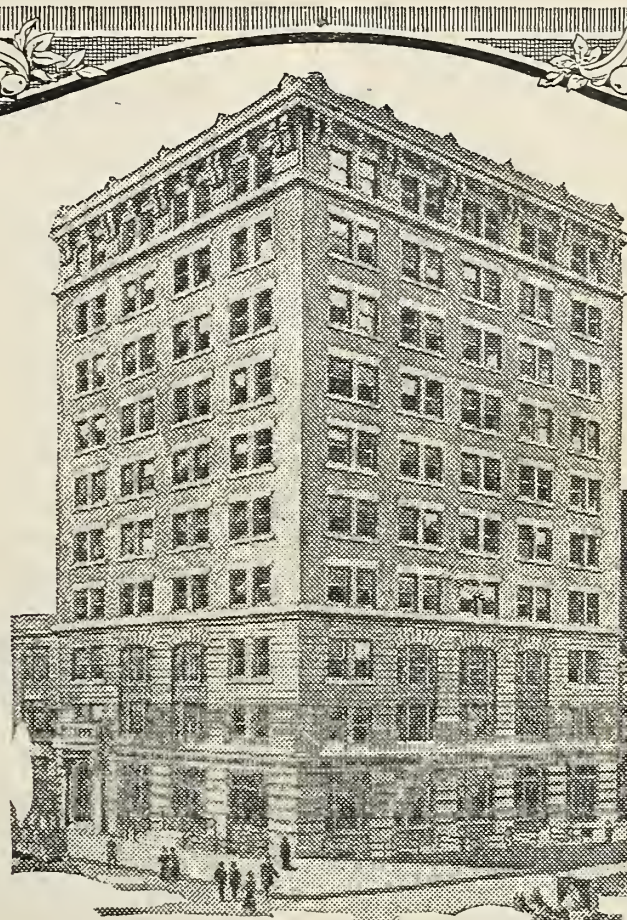
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IS OUR FIRST N-AIM.

PERFECT
FRUIT LABELS

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SIMPSON & DOELLER
CO.
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PORTLAND, OREGON.

GET OUR SAMPLES
AND PRICES

WE CAN FILL YOUR
ORDER FOR STOCK
APPLE, PEAR, CHERRY
AND STRAWBERRY LABELS
IN 24 HOURS.



Fruit Auction Building

Auctioning Fruit for 26 Years

Over 26 years ago we began to sell fruit at auction to a handful of buyers in a little room. While our start was small, our ideas and our ideals were big.

In the early days our slogan was—"Work for the seller as hard and as conscientiously as we ourselves would like to be worked for and *always* give him a square deal."

Throughout all these years there has been no change in our ideals.

As a result, we were compelled to build our own building with three large auction rooms especially adapted for auction sales. Our building is the largest and most up-to-date building in the United States devoted to the fruit auction industry. It is located in the very heart of the fruit and vegetable district, which is the geographical center of the great metropolitan district, comprising a population of 8,000,000 inhabitants.

The United Fruit Company, Florida Citrus Exchange, Porto Rico Fruit Exchange, Stewart Fruit Company, Frank H. Buck Company, Thurston Fruit Company, among the country's largest fruit interests, are some of those who sell through our auction.

If you are not satisfied with the prices you are receiving or with the service you get, you may learn something of interest if you will write us for full particulars about selling at auction.

THE FRUIT AUCTION COMPANY
Established 1896

202-208 FRANKLIN ST.

NEW YORK CITY

Marketing News of Interest

MID-JANUARY reports from the large cities of the East nearly all reported the boxed apple market as "steady" and "firm." In general, demand was said to be moderate and some markets reported it light. At the same time nearly all showed only limited supplies. New York reported limited supplies, moderate demand and firm market.

New York auction prices on January 18 follow: Spitzenbergs, XF large to very large, \$3.35 to \$3.70; medium to small, \$2.80 to \$3.25; fancy large to very large, \$3.05 to \$3.30; medium, \$1.75 to \$2.95; Romes, XF, medium to very small, \$2.60 to \$3.30, mostly \$2.65 to \$2.80; fancy, large to very large, \$2.85 to \$3.00; Delicious, XF, very large, \$4.65 to \$4.90; large, \$3.50 to \$3.90; few \$4.65; fancy, very large, \$3.30 to \$3.95; large, \$2.95 to \$3.30; Winesaps, faced and filled and jumble, \$1.60 to \$1.65; Newtowns, XF, large to very large, \$2.70 to \$3.05; medium, \$2.40 to \$2.75; small to very small, \$1.95 to \$2.55; fancy, large to very large, \$2.70 to \$2.80; medium, \$2.40 to \$2.65; C grade, large to very large, \$2.55 to \$2.65; medium, \$2.20 to \$2.40; small to very small, \$1.85 to \$2.10.

APPLES of the Spokane Valley Growers' Union of Opportunity were packed and marketed at an average cost to the grower of 39¾ cents a box, compared with 48½ cents in 1920, according to Harry Nelson, assistant manager.

The average returns to the grower were considerably higher than in 1920. The Delicious pool brought a total of \$29,310.84; the Winter Banana apples sold for \$27,442.67; Wageners, \$54,166.47; Baldwins, \$986.47, and Grimes Golden, \$6,668.09.

Average net prices to the grower on all grades of apples handled in the pools already closed were: Delicious, \$2.16¼; Winter Banana, \$1.87¼; Wagener, \$1.02¼; Baldwin, \$1.04¼; Grimes Golden, \$1.32¼; Maiden Blush, \$1.22¼; Snow, 85¼ cents; McIntosh, \$1.52¼, and Gravenstein, \$1.35¼.

LESS than 5,000 cars of apples remained in storage in Washington on January 20, according to figures of the Spokane office of the federal bureau of markets. The apples remaining in storage were held at Wenatchee and Yakima, it was reported, the growers of the Spokane Valley and Walla Walla district having shipped all of their fruit.

December car lot shipments for the Northwestern states were reported as follows: Idaho, 287; Montana, 19; Oregon, 992; Washington, 2956. In potato shipments of December, Idaho led, with 839 cars. Washington reported 387 cars and Oregon 102.

AT CONCLUSION of the grape shipping season, traffic chiefs of the Southern Pacific and Santa Fe railroads announced that their lines had hauled to 6200 cities and towns outside of California a total of 422,000 tons of grapes.

valued at \$50, 640,000. The total in cars was 28,800, or 5,300 more than handled last season. The average price per ton was around \$120.

FINAL payment on the 1921 walnut crop has been made to members of the California Walnut Growers' Association. This payment alone amounted to \$2,000,000. Entire expenses of handling the crop are covered by retention of five per cent of the sales price by the association, this even including the one per cent discount allowed cash buyers.

SENT on consignment, under a guarantee of at least \$1 a box net, Heffron & Nicolla recently shipped three cars of Winter Nelis pears from their Sunnyside Valley ranch for London, England. This was said to be the first time a grower of this valley had shipped fruit direct to the London markets.

WASHINGTON

PUYALLUP Valley berry growers received a total of \$1,137,710 for 1921 crops. For King county it is estimated that the crop brought the growers \$2,000,000 and that another \$1,000,000 was obtained by the fruit and berry growers of the Grays Harbor section. The Puyallup returns were under those of the two previous years, but lowered costs are said to have more than offset the difference.

TWENTY-TWO pruning demonstrations, covering 24 communities, were conducted in Yakima county last month under direction of E. G. Wood, extension horticulturist of Washington State College. He had the co-operation of project leaders in each of the communities.

FRUIT crops of the Walla Walla district for 1921 are estimated to have had a value of \$2,100,000. Of the total the apple crop value is placed at \$1,500,000, prunes at \$350,000 and small fruits at \$250,000.

Irrigate!

without cost of pumping and without expensive flume construction, if you have water *below* your land, so situated that you can get a slight fall.

Hill Hydraulic Rams

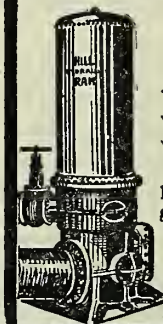
are made in 12 sizes, 1 inch to 24 inch, delivering capacities to 3,600,000 gallons per day.

They make the water pump itself

Our engineers will advise you. If a ram will work on your project, it will save you money.

Write today for free catalog. R-1 domestic; R-2 irrigation.

Seattle Machine Works
85 W. Lander St.
Seattle, Wash.



This Complete SEED Catalog and Planter's Guide

—lists the finest seeds for the Northwest and tells how best to grow them.



FREE

DIAMOND QUALITY SEEDS

produce the finest vegetables for table or commercial purposes. Acclimated seeds, laboratory tested for germination, selected strains, absolutely true-to-name.

Catalog lists our complete line of Nursery Stock, Poultry, Bee and Garden Supplies.

Demand Diamond Quality Seeds from Your Local Dealer.

PORTLAND SEED CO.
PORTLAND, OREGON

BABY CHICKS

Order Now!

Agents for
Buckeye
Incubators and
Brooders
Sharples
Separators

SPRAYERS

For EVERY NEED

We make right here in Portland the most complete line of fine Sprayers you can find.

**FINEST WORKMANSHIP
BEST MATERIALS**

We'll take in your Old Sprayer on a New, Efficient One.

SPECIAL! We have ten-barrel Sprayers we are offering at only \$20. A bargain you cannot afford to pass up.

Write Us Your Needs

Quality Sprayer Mfg. Co.
245 Grand Ave., Portland, Ore.

AT PARKER, W. F. Madaris found the winter weather so mild that he planted some orchard trees recently. He is planting 31 acres to soft fruits. There will be 20 acres of peaches, six acres of cherries and five acres of apricots. He plans to grow potatoes and soy beans as fertilizing crops and to pasture the latter with hogs.

FIGURES indicating the increased yields gained from proper fertilization of orchards have been given out by the American Fruit Growers, Inc., for its Yakima Valley properties. The steadily increasing yields, attributed almost entirely to use of commercial fertilizers, are thus reported: From 365 acres of apples in 1919, 55,000 boxes; in 1920, 66,000 boxes, and last season 84,000 boxes.

PRUNERS put on the winter pruning job recently by the Thompson Fruit Company, at Buena, were hired at the rate of 20 cents an hour, it was reported.

JOHN MORRIS HOFF has successfully demonstrated that English walnuts can be grown in Clarke county. He has been growing them for 18 years on his farm near Sara. He now has a grove of about 100 trees, most of them 18 years old, from which he harvested over three tons last year.

FIGURES compiled at Sumner are said to show the following average crop productions per acre in the Puyallup Valley last season: Blackberries, six tons; gooseberries, five tons; raspber-

ries, currants and strawberries, three tons; rhubarb, ten tons and asparagus, five tons.

AT the annual meeting of the Washington State Horticultural Association these officers were elected: R. H. Kipp, president, Quincy; Dr. L. Geary, first vice-president, Underwood; Paul Weyrauch, second vice-president, Walla Walla; H. L. Douglas, Wenatchee, and C. M. Lockwood, Opportunity, directors.

LAST month the Washington Prune Growers' Association sold 250,000 pounds of Clarke county prunes to Holland interests. They were consigned for that country on the steamer *Moerdyk*, which sailed from Portland about two weeks ago. This was the first foreign shipment of prunes made by the association since before the world war. The price was 12½ cents, f. o. b. Vancouver, for 30-40s.

GRANDVIEW'S apple exhibit, which took first prize at the Northwest Fruit Exposition in Seattle, was sent to Chicago, where it was displayed in a big store window on Michigan avenue. Thousands of Chicagoans saw and admired the exhibit.

LOMBARD & HORSLEY, of the Parker Heights district, at Buena, have announced that they will set out between 25 and 40 acres of peaches in the spring. They will plant Elbertas. These are preferred to the J. H. Hale, say the orchardists, because they require no hand thinning.

THE Puyallup & Sumner Fruit Growers' Canning Company sent forth approximately 200,000 jars of Paul's jams for the Christmas trade. This was almost double the amount sent out in 1920, so ready has been the sale of this high-class product of the Northwest.

THE plant of the Chelan Produce Company used for evaporating apples, was recently destroyed by fire, entailing a loss of \$50,000.

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And they're clean as a whistle, grown on new ground containing no bugs or pests. Every tree inspected by us and once by the district horticultural deputy inspector.

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OREGON

THE Cottage Grove cannery last season put up 321 tons of fruits and vegetables. Plans are being considered for enlarging the plant, it is reported. The cannery reported earnings of 20 per cent on its stock, despite unfavorable conditions of the season. ▲ ▲ ▲

EARLY this year the Apple Growers' Association issued a call to its growers at Hood River and other points to begin placing their orders for boxes at once. The bulletin announced that supplies of apple and pear boxes were available at once. ▼ ▼ ▼

UNUSUALLY heavy snowfalls of the winter have not been particularly pleasing to the orchardists of Hood River Valley, but not so with the growers of strawberries. The snows, it is said, have set the stage for a bumper crop of berries. ▲ ▲ ▲

WOMEN of the auxiliary of the Hood River Post, American Legion, were instrumental at Yuletide in sending a lot of Hood River apples and other delectables to disabled ex-service men in the Portland hospitals. ▲ ▲ ▲

NEAR the village of Home, bordering on the Snake River, W. E. Hall has one of the finest and most dependable orchards in the state. His tract, which contains about 125 acres, is in a cove that never sustains damage from frost. Last season Mr. Baker shipped 39 cars of peaches, 17 cars of apples, two cars of grapes, one of apricots and two of asparagus. Ninety acres of his ranch is set to peaches of the Early Crawford, Elberta and J. H. Hale varieties. He has 24 acres in apples and six in grapes. ▲ ▲ ▲

A. C. PETERSON, who had been located at Dallas for some years, more recently as superintendent of the Oregon-Washington district of the California Packing Corporation, has been transferred to an enlarged territory in California, with headquarters at San Francisco. ▲ ▲ ▲

AN INCREASE of \$10,140 in value of the apple crop from a 20-acre orchard of 12-year-old trees is credited to the demonstration work of Fred Bennion, county agent of Umatilla county, and Clayton L. Long, extension horticulturist of Oregon Agricultural College. The orchard is that of J. F. Slover of Freewater, where a three-year programme of pruning, spraying and thinning has been conducted by the two experts. ▲ ▲ ▲

THE five processing plants at Salem are credited with a new record of production for that city in output of fresh fruit and vegetable packs in 1921. The total pack is given as 32,791,232 pounds. The aggregate value of the pack is given as \$2,000,000. ▲ ▲ ▲

BETWEEN 850 and 1000 acres of cover crops were planted in orchards of Lane county. This was the result of a campaign conducted by a horticultural extension committee which urged upon the orchardists this modern means of enriching the soils of their tracts. ▲ ▲ ▲

FRED WRIGHT, berry grower at Hubbard, recently sold his 16-acre ranch to Mrs. Helen Jones of Portland. Wright created two or three near-stampedes in Portland last summer by attempting to put strawberries on the market at a price considerably below prevailing quotations. ▲ ▲ ▲

A MEETING of the North Marion County Berry Growers' Association was held at Woodburn last month. A proposition of President Graves of the Graves Canning Company to take berries on an installment or co-operative plan was received and taken under consideration. ▲ ▲ ▲

A DISH of prunes from a tree 70 years old was recently served at Albany, but the tree in

question stands in the historic Union Point section, three miles south of Brownsville. ▲ ▲ ▲

MARK A. Mayer, owner of one of the largest orchards in the Mosier district, recently presented a tract of 60 acres to the State Highway Commission. The land is on the Columbia River Highway and is to be used as an auto camping ground.

IN ONE day the Hood River Canning Company turned out 1000 gallon cans of apples, packed under variety labels of the company, for foreign shipment via the Panama Canal from Portland. ▲ ▲ ▲

THE Dufur Orchard Company reported shipment of 194 cars of apples during the 1921 season, from its orchards at Dufur.

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SILVERTON promises to become the center of a walnut growing district. Many farmers have trees enough to supply home needs and commercial plantings are now being started. J. Smith is said to have purchased a 25-acre tract one mile south of Silverton, with the intention of planting it exclusively to walnuts.

CALIFORNIA

LADY APPLES have become a favorite on the farm of Allen Tuffin, near Lotus, following successful experience with this variety. Mr. Tuffin is having 140 five-year-old trees grafted over to Lady apples. He tried out an experimental plot of 50 trees and the apples from these sold last fall at \$3 and \$4 a box, he reported.

UP to about the end of December, 2,551 cars of apples from the Pajaro Valley had been forwarded from the Watsonville station. Of these 756 cars were shipped East. Shippers had on hand less than 100 cars. A year ago at the same time the valley had shipped 2333 cars.

PEAR blight, because of inefficient control work on rented orchards, made rather serious gains during September and October in the Placerville district, according to report of the county horticultural commissioner.

THE Earl Fruit Company is issuing \$2,500,000 of bonds, secured by mortgage on its California holdings. A goodly portion of the funds derived from the bond sale is to be used in development of the Howard Reed Orchard Company property in Yuba county. This consists of 325 acres, planted largely to Bartlett pears.

THE drying plant of the Loma Fruit Company at Watsonville burned recently, together with about 10 tons of dried and drying fruit. The loss is placed at \$20,000, partially covered by insurance.

AT SEBASTOPOL there has been established the Gravenstein Apple Growers' Contest. This competition began December 1 and is to last five years, with the object of discovering methods that bring maximum yields and finding individual high yielding trees to be used as the basis for obtaining better stock.

THE California Almond Growers' Exchange received orders for fully 3000 bags more almonds than it could fill. The second advance has already been made to the growers, who have now received sums ranging from 7 cents a pound for the lower grades to 14 cents for Nonpareils.

CHERRY growers of San Joaquin county recently formed an organization to co-operate with associations already formed in Sonoma and Napa counties. Seven growers, representing 200 acres of bearing trees, signed as charter members.

LAST month at San Diego, Cal., a commission merchant who had packed apples in unlabeled boxes and also in boxes with Oregon labels was assessed a fine of \$50 under provisions of California's standard apple act.

IDAHO

THE Payette Valley Produce Exchange has been incorporated at Payette, with a capital of \$100,000. The purpose is that of giving the grower an opportunity of selling his produce through a sales agency maintaining accurate accounting features. Officers of the exchange are: George Rezac, president; David Jones, vice-president; Clarence Van Deusen, secretary.

DURING the past season 150 cars of lettuce were shipped from Nampa. Lettuce tonnage from this district began with a nine-car movement in 1919 and the shipment of 26 cars in 1920.

FROM the closely affiliated communities of Parma, Roswell, Wilder and Apple Valley, 1921 shipments of fruit and produce were: Apples, 387 cars; fresh prunes, 91 cars; dried prunes, four cars; potatoes, 272 cars; lettuce, 25 cars; onions, one car; honey, three cars.

ACCORDING to figures of the state bureau of plant industry, Idaho has 31,848 acres of land devoted to fruit growing. The value of these lands, including trees, is placed at \$13,212,700.

COMPLAINT was made late in the shipping season by Miles Cannon, state commissioner of agriculture, that he found indications that Eastern commission interests were holding back cash belonging to Idaho apple shippers in order to ease financial conditions in the East.



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R. H. SHUMWAY, Rockford, Ill.

With the Poultry

INCUBATOR INVESTMENT

AFTER the poultryman has made up his mind to buy an incubator, he is confronted with the question of makes and sizes. As a general rule, a cheap machine is a poor investment, requiring more attention than a good one and wearing out quicker, besides being less dependable. The value of the machine is small compared with that of the eggs used during the normal life of an incubator. It is poor economy, therefore, to buy a machine which is not reliable. Whenever possible it is well to select the kind of incubator that has given satisfaction in your neighborhood, so that you may get the benefit of the experience of other operators near by.

The best size of incubator to buy varies with numerous circumstances, say poultry specialists of the United States Department of Agriculture. About as much time is required to care for a 60 as for a 300-egg machine; it is usually advisable to get one of at least 150-egg capacity. Special conditions, though, often exist which make smaller machines valuable.

A small machine is often used in connection with a larger one, all eggs being placed in the large machine after the first or second test. Many poultrymen believe that it pays to have an incubator large enough to hatch the bulk of their stock in two or three hatches, so that much time is saved in tending to the incubators and brooders. In addition the chickens are more uniform in size than those hatched when the incubating period extends over a longer time.

A fair estimate for a poultry farm is an incubator of one-egg capacity per hen, provided that about one-half of the flock is to be renewed yearly and no outside hatching is carried on. The larger machines cost less in proportion to their capacity than the smaller ones.

EARLY HATCHING

FOR those who do not run their own incubator there are, of course, two methods of keeping up their flocks—either by the old accepted way of hatching with one's own hens or through purchase of baby chicks or pullets. For those who maintain a flock of good size there is a lot to be said in favor of purchasing baby chicks from a reliable source. With the average small-farm flock, where hens of a general purpose breed are kept, it is generally advisable to let the hens do the hatching.

Whatever the method of hatching, it is most important that it be done at the right time of year. The aim should be to hatch the chicks at such a time as will allow the pullets to reach their full development and begin laying in October or November, as these earlier maturing pullets must be depended upon very largely for the fall and winter egg production. Late-hatched chicks do not mature in time to produce fall and winter eggs nor do they live or grow so well during the hot weather.

VIGOROUS CHICKS

IT IS hardly possible to put too much emphasis upon the importance of proper feeding of baby chicks to give them a good, healthy start and to put them in a healthy, vigorous, growing condition. Chick diseases are prevented if care is taken in the method of feeding. The best of grains and prepared foods should be used for chicks. Regularity in feeding is immensely important. Pure, clean water should be available. In the brooder facilities, orderliness and cleanliness should prevail. Check over your plans and equipment to make sure that you are prepared to give the chicks the right start in incubation, brooding and feeding.

IF YOU are one of those who derive nothing, but discouragement from the fact that egg

prices fell to unusually low levels this winter you are not very loyal to the game and might about as well drop out.

▲ ▲ ▲

DID you know that the government experts have acknowledged that use of artificial lights in the poultry house increases the egg output? This method is being tried in England perhaps more widely than in this country. The real object, it should be remembered, is primarily that of getting the hens and pullets to feed longer than they otherwise would during the short winter days.

▲ ▲ ▲

IN BUILDING the poultry house the site should be on light, porous soil, if possible. A slope that provides good air and water drainage is preferable. Exposure to sunshine and protection from winds are other important points. These problems are fully discussed in a new bulletin that may be had on request, from the Oregon Agricultural College Experiment Station, at Corvallis.

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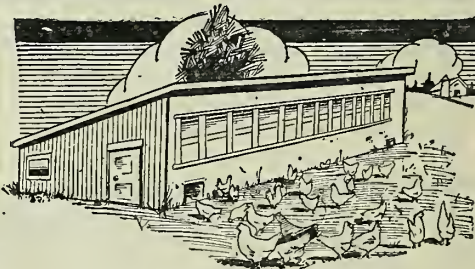
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Write today, stating your qualifications.

BETTER FRUIT PUBLISHING COMPANY

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Our Inquiry Department

IN a future issue please state your opinion as to the benefit of feeding apples to laying hens during the winter months.—J. B. F., Oregon.

Even good, sound apples have no virtue over the much less expensive green foods recommended for the hens' winter diet. But the almost invariable trouble in this connection is that apples carrying decayed spots are given the hens. The proportion of these usually increases, in fact, as the season grows later. Hens are not like hogs in being scavengers. They should never be fed rotten apples. This, we judge, gives you an adequate answer, for it is entirely unlikely that you or any other readers care to feed sound apples to their poultry.

▲ ▲ ▲

I WANT to sow clover for cover crop in some fall wheat I have on my place. When should I sow it?—H. J. C., Washington.

As you are in western Washington you will find the best time to sow the clover comes this month. Fall wheat makes an excellent nurse crop so you should have little trouble in getting a good stand. Readers living east of the mountains will do well to wait until about the first or second weeks in March.

Bees for Pollination

By H. A. SCULLEN

Specialist in Bee Culture, Oregon Agricultural College

FREQUENTLY we are asked by orchard owners and managers how many colonies are necessary for proper pollination of a given acreage. This is not the vital question, since one strong colony will do more pollenizing than 10 weak ones.

The normal colony should come through the winter with a working force in early February of close to 15,000 bees. The attempt then should be to build this force up to 50,000 or more. Good heavy-laying, standard Italian queens are doubtless the most important requisite.

Next it is highly important that the queens be provided with conditions favorable for maximum brood rearing, during the early spring. The first condition necessary is ample stores. The queen tends to stop egg laying when the stores in the hive drop to approximately 15 pounds. It is a good practice to see that a surplus beyond this amount is always present.

With sufficient stores and favorable conditions, a good queen will during late March find the one-story, ten-frame hive too small, so will be unable to lay to her full capacity. It is important to remember that the workers hatched from eggs laid three weeks before fruit bloom are the bees which will do the bulk of the pollenizing and for

that reason it is extremely important to have the queen laying to her maximum capacity at that time.

When colonies have come through the winter in good condition, and the weather has permitted them to gather considerable nectar from the maples, they are very apt to make preparations for swarming about the second week of April, which, if not prevented, will greatly lessen their number of field workers. It is, therefore, of extreme importance that the colony not only be built up to the maximum strength, but that it be kept from dissipating this strength in swarming just before or at the starting of fruit bloom.

Some of the important factors in swarm prevention are: Young queens, not over two years old, preferably only one year old; a minimum of drone comb, resulting in a minimum number of drones in the hive; sufficient ventilation; a moderate amount of shade during the hottest part of the day; sufficient brood rearing room, that is, two ten-story hives or a larger one-story hive.

Another item to consider is location of the bees in the orchard. In this connection the writer would suggest that although the bees under certain conditions will go several miles for nectar, they will do more efficient pollenizing if they are not compelled to go over one-half mile.

They should be so located that it would not be necessary to drive or work horses directly in front of the hive. It would also be to an advantage to have the prevailing winds blowing from the orchard toward the bees. The bees prefer to fly light against the wind and loaded with the wind. This would assist in getting the bees to work on the owner's orchard in preference to the neighbors, if it is possible to influence them at all.

In order that the bees may take advantage of every opportunity to work on the fruit bloom during unsettled weather conditions, it would be advisable to have no shade over them during the period of pollenizing, so they will be attracted out whenever the sun appears.

From what has been said, one can readily see the necessity of having the bees under the care of some one who is familiar with their management in order to get good results, and avoid loss from disease, swarming and other factors.

If the owner is not experienced in managing bees properly, it would be more economical to turn them over to a practical bee keeper to care for or to dispose of the bees and pay a bee keeper to move bees to the orchard during blooming period. The usual charge for the latter ranges from \$3.00 to

\$5.00 a colony, depending upon the difficulty in moving the bees to and from the orchard. When bees are run on shares by another the crop and increase are divided equally between the owner and manager, in which case the owner furnishes all necessary supers and other equipment. If the manager must supply extra equipment, he must receive a higher per cent, say three-fourths of the crop.

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CORY THORNLESS BLACKBERRY—Large, delicious. You get well rooted plants true to name from Pioneer grower. Wm. Mortenson, Rt. 1, Lodi, California.

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CUTHBERT RED RASPBERRY PLANTS—\$1.25 per 100, or \$8.00 per 1000, F. O. B. Alvadore, Oregon. E. P. Saunders, Alvadore, Oregon.

BEES

BOOKING ORDERS now for spring delivery. Virgins, golden and leather-color Italian queens; bees by the pound and nuclei. Write for prices; circular free. A. J. Pinard, 440 No. Sixth St., San Jose, Calif.

BEES AND QUEENS—Keep bees to pollinize your fruit. Get more and better fruit. Make a profit off the fruit and bees too. Write for circulars. Nueces County Apiaries, Calallen, Texas.

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BABY CHICKS—Reduced prices on White Leghorns, Reds, Barred Rocks, White Rocks, Minorcas and Anconas. Booking orders now. Postal secures Free catalog. Write today. C. N. Needham, Salem, Oregon.

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CHOICE Mammoth Bronze Turkey Toms, \$10. Mrs. Amelia Reimers, Eagle, Idaho.

REAL ESTATE

FOR SALE—Fine orchard in the White Salmon Valley fruit district. About 14 acres in pears and 15 acres in apples, all commercial varieties, 6 to 13 years old; \$5,000 storage and packing house, other buildings; all necessary machinery and implements; plenty spring water; about 55 acres in farm; 2 miles from station on fine road; price \$25,000, with terms, or \$21,000 cash. Other interests compel non-resident owner to sell. Write for more particulars to P. O. Box 8, Underwood, Wash.

FORTY-THREE ACRES—Upper Hood River Valley, on new Loop Road around Mt. Hood; 15 acres commercial orchard, 10 years old, just coming into full bearing; 2 acres strawberries; 3 acres alfalfa; 4 acres under plow; fine potato land. Two good houses; two barns, one used for packing house; good stream, some free water; every acre under irrigation ditch; two miles from town; depot, stores, grade and high schools, church and library. One of choicest locations in upper valley. Fine view of Mt. Hood and Mt. Adams. Price \$15,000, \$6,000 cash. M. I. C., care Better Fruit.

BARGAIN—Fine 13-acre apple orchard, planted to Delicious, Grimes Golden and Jonathans; eleven years old; running water; well located; this would make an ideal fruit and poultry ranch. On good county road one mile from good educational town. For further particulars and price write Box G, Philomath, Benton County, Oregon.

CUT-OVER and Developed Lands, 15 to 25 miles N. E. Spokane; extra good soil; spring brooks; grows grain, vegetables, hay, fruits; several developed ranches; few stock ranches; \$10 to \$20 acre; 10 years' time, 6 per cent interest. Free lumber. Write owners for free book. Edwards & Bradford Lumber Co., Elk, Wash.

FOR SALE—62-acre farm, 48 miles south of Portland; running water; horses, cattle, machinery and furniture. A. H. Koppang, Silverton, Ore.

WANTED—To hear from owner of good ranch for sale. State cash price, full particulars. D. F. Bush, Minneapolis, Minn.

FOR SALE—Apple orchard, commencing to bear; finest box varieties; highest quality attained. Bolling Hall, Waynesville, N. C.

WANT TO HEAR from owner having farm for sale; give particulars and lowest price. John J. Black, 197th street, Chippewa Falls, Wisconsin.

TO LEASE—35 to 200 acres of first class fruit land on shares. Martin Bros., Brownsville, Ore.

MISCELLANEOUS

TRACTOR BARGAINS—Cletrac "W," only demonstrated, \$1250; Cletrac "W" rebuilt, good as new, \$1000; Cleveland model "H," never used, \$1100; Cleveland "H," slightly used, snap at \$750; Oldsmar Garden Tractor demonstrator, \$390. O. V. Badley, 425 E. Morrison, St., Portland, Oregon.

WANTED—To examine your orchard for you before you buy. I saved one man \$5000 on a \$14,000 deal. To look after orchards of non-resident owners. Many are poorly cared for and rapidly depreciating in value. Private pruning demonstrations and consultations given. Luke Powell, consulting horticulturist, Yakima, Wn.

WALL BOARD—Write for samples of Washington plaster wall board; won't warp, won't burn. Manufactured by Washington Building Products Co., 6851 E. Marginal Way, Seattle, Wash.

SWEET CLOVER SEED for sale—Buy direct from the producer and save money. Write for samples and prices. Address Geo. Forest, Standish, California.

HONEY—Finest table honey: "Western Blossom" brand, in 6-pound tin can, postpaid for only \$1.25 up to fourth zone; absolutely unadulterated—just as the bees made it. Spokane Seed Co. 906 First Ave., Spokane Wash.

TOBACCO—1919 leaf best chewing, three pounds, \$1; ten, \$3; chewing and smoking, ten, \$2.50; regular smoking, ten, \$1.50; fifty, \$6; satisfaction guaranteed. Producers' Distributors, Murray, Ky.

KENTUCKY LEAF TOBACCO—3 years old, nature cured. Don't send a penny; pay for tobacco and postage on arrival. Extra fine quality chewing or smoking, 10 lbs., \$3.00; medium quality smoking, 10 lbs., \$1.25. Farmers' Union, D-65, Hawesville, Ky.

TOBACCO—Kentucky natural leaf chewing and smoking; rich, ripe, mellow; two years old; aged in wood; 10 lbs., \$3; 20 lbs., \$5; sample, 20c. Maddox Bros., Dept. 22, Mayfield, Ky.

TOBACCO, 1919 LEAF SELECT—Chewing, 3 lbs., \$1.00; 10 lbs., \$3.00; chewing and smoking, 10 lbs., \$2.50; regular smoking, 10 lbs., \$1.50; guaranteed. Producers' Distributors, Murray, Ky.

HOMESPUN TOBACCO—Chewing, 10 pounds, \$2.50; 20 pounds, \$4; smoking, 10 pounds, \$2; 20 pounds, \$3.50. Farmers' Union, Mayfield, Ky.

FOR SALE—Hubam annual sweet clover; scarified seed; genuine Hughes strain; Free Sample. Jas. H. Kitchen, Rt. 5, Springfield, Ohio.

HONEY—Pure, First Quality Yakima Valley alfalfa, sweet clover honey; direct from producer. Send for circular and prices. Oliver Sires, Wapato, Washington.

HUBAM Annual White Sweet Clover Seed; inspected by county agent. Albert Day, Newtown, Ohio.

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